PANTAO
(International Journal of the Humanities and Social Sciences)
Volume 5, Issue 3
ISSN 3028-0877 | e-ISSN 3155-6043 | DOI 10.69651/2022PIJHSS

Teachers' and school heads' perceptions of Grade 11 students' mathematics proficiency, attitudes, and performance

Aljun D. Cadorna*
Northeastern College, Santiago City, Isabela, Philippines

ABSTRACT

Mathematics proficiency, attitudes, and performance are important indicators of students' readiness for higher education and future work. However, local evidence examining these dimensions together among senior high school students remains limited, particularly from the perspectives of teachers and school heads. This study examined the perceived mathematics proficiency, attitudes, and performance of Grade 11 students and compared the perceptions of mathematics teachers and school heads. A descriptive-comparative survey design was used with 68 respondents, comprising 25 school heads and 43 Grade 11 teachers. Data were gathered through a structured questionnaire supported by informal interviews and documentary analysis. Weighted means and an independent-samples t-test were used to analyze the data. Results showed high mathematics proficiency and strongly positive attitudes across the assessed dimensions. Mathematics performance was also rated very high in classroom participation, task completion, assessment performance, and application of mathematical concepts. No significant difference was reported in perceptions of proficiency and performance, whereas attitudes differed significantly. The findings support sustained instructional and professional development efforts.

Keywords: Mathematics proficiency, mathematics attitudes, mathematics performance, senior high school, teacher perceptions.

Date Submitted: August 28, 2026
Date Accepted: September 10, 2026
Date Published: September 21, 2026

INTRODUCTION

Mathematics occupies an important place in senior high school education because it develops quantitative reasoning, problem-solving, and logical thinking needed for further education and employment (National Council of Teachers of Mathematics [NCTM], 2014). In the Philippine context, senior high school serves as an important stage for consolidating mathematical learning and preparing students for academic and career pathways under the K to 12 curriculum (Department of Education [DepEd], 2013). Understanding how students perform in mathematics therefore requires attention not only to what they know but also to how they approach mathematical learning.

*Corresponding author / Email: aljun.cadorna@deped.gov.ph
DOI: http://doi.org/10.69651/PIJHSS05031544

Recommended citation:
Cadorna, A. D. (2026). Teachers' and school heads' perceptions of Grade 11 students' mathematics proficiency, attitudes, and performance. Pantao (International Journal of the Humanities and Social Sciences) 5 (3), 4484-4491. http://doi.org/10.69651/PIJHSS05031544

Mathematics proficiency is multidimensional. It includes conceptual understanding, procedural fluency, problem-solving, and mathematical reasoning. Large-scale assessments such as the Trends in International Mathematics and Science Study and the Programme for International Student Assessment have emphasized the importance of applying mathematical knowledge rather than merely producing correct answers (Mullis et al., 2016; Organisation for Economic Co-operation and Development [OECD], 2018). These international assessments provide broad evidence of mathematics achievement, but school-level studies remain important because local learning conditions and school contexts may produce patterns that large-scale assessments cannot fully capture.

Students' attitudes toward mathematics also influence their learning experiences. Interest, confidence, and perceptions of the usefulness of mathematics have been associated with mathematics achievement (Ma & Kishor, 1997). Bandura's (1997) self-efficacy theory further explains that students' beliefs about their capabilities influence the effort they exert, their persistence when difficulties arise, and their eventual performance. Students who believe that they can succeed are more likely to persist when confronted with challenging mathematical tasks.

The value students attach to mathematics is likewise important. Expectancy-value theory proposes that students' expectations of success and the value they assign to a task influence their motivation and achievement-related behavior (Wigfield & Eccles, 2000). Similarly, the Theory of Planned Behavior suggests that attitudes contribute to behavioral intentions and subsequent actions (Ajzen, 1991). These perspectives indicate that mathematics learning is shaped by both cognitive and affective factors.

The present study was grounded primarily in self-efficacy theory and was further informed by cognitive, constructivist, expectancy-value, and school-learning perspectives. Bloom et al. (1956) emphasized increasingly complex cognitive processes, while Piaget (1972) and Vygotsky (1978) viewed learners as active participants in constructing knowledge through experience and interaction. Carroll's (1963) model of school learning likewise emphasized factors such as aptitude, opportunity to learn, perseverance, and quality of instruction.

Despite the importance of these dimensions, the literature reviewed in the original study indicated limited local research examining mathematics proficiency, attitudes, and academic performance together among senior high school students. The study therefore addressed this gap by examining these dimensions among Grade 11 students in public senior high schools in Legislative District 5, Isabela. It specifically considered conceptual understanding, procedural skills, problem-solving ability, mathematical reasoning, interest and motivation, confidence, persistence, value placed on mathematics, classroom participation, completion of mathematics-related requirements, assessment performance, and application of mathematical concepts.

The study also compared the perceptions of school heads and mathematics teachers. Such comparison was considered useful because the two groups observe students from different professional perspectives. Identifying areas of agreement and difference could provide a more informed basis for instructional planning and school-level interventions.

Statement of the problem

This study aimed to examine the perceived mathematics proficiency, attitudes toward mathematics, and mathematics performance of Grade 11 students. Specifically, it assessed mathematics proficiency in terms of conceptual understanding, procedural skills, problem-solving ability, and mathematical reasoning; examined attitudes in terms of interest and motivation, confidence, persistence, and the value placed on mathematics; and determined mathematics performance based on classroom participation, completion of mathematics-related tasks, performance in quizzes, tests, and examinations, and application of mathematical

concepts in academic tasks. The study also determined whether significant differences existed between the perceptions of school heads and mathematics teachers across these dimensions.

METHODOLOGY

The study employed a descriptive-comparative survey design to examine the mathematics proficiency, attitudes, and performance of Grade 11 students during the 2023–2024 school year. The original thesis described the approach as descriptive-normative and explained that descriptive research is appropriate for examining the current conditions of a group and identifying relationships and differences among variables.

The design was appropriate because the study did not manipulate any variable. Instead, it described the respondents' perceptions and compared the perceptions of school heads and mathematics teachers.

The study was conducted in public secondary schools in Legislative District 5 of the Schools Division of Isabela. The district comprised the municipalities of Aurora, Burgos, Luna, Mallig, Quezon, Quirino, Roxas, and San Manuel.

A total population sampling approach was used. The participants consisted of 68 respondents: 25 school heads and 43 Grade 11 mathematics teachers. The school heads represented the participating districts, while the teachers were drawn from the same school settings.

Research instrument

Data were collected using a structured questionnaire developed from the literature reviewed in the study. The instrument consisted of four parts: respondent profile, mathematics proficiency, students' attitudes toward mathematics, and mathematics performance.

The questionnaire was subjected to a try-out involving selected school heads and College Algebra teachers. Feedback from the try-out and the research adviser was incorporated into the final instrument.

The questionnaire used a five-point Likert scale. For mathematics proficiency and performance, the scale ranged from 1.00 to 5.00, with scores of 4.21–5.00 interpreted as very high. For attitudes, the corresponding highest category was strongly agree.

Informal interviews were also conducted during questionnaire retrieval to clarify responses. Relevant records and inventories were consulted through documentary analysis to support the accuracy of the collected information.

Permission to conduct the study was obtained through the Schools Division Office and the appropriate district authorities. The questionnaire was revised following validation and was personally administered and retrieved by the researcher. The completed questionnaires were then tallied and prepared for statistical analysis.

Frequencies and percentages were used to describe the respondents' profiles. Weighted means were computed to determine the perceived levels of mathematics proficiency, attitudes, and performance. A t-test was used to compare the perceptions of school heads and mathematics teachers.

RESULTS AND DISCUSSION

The 68 respondents consisted of 25 school heads and 43 teachers. The school heads were generally older than the teachers. Among the school heads, the largest group was 46–50

years old (32%), followed by those aged 51–55 (28%) and 56–60 (24%). In contrast, 76.74% of the teachers were 31–35 years old. This pattern suggests a clear difference in the career-stage composition of the two groups.

Male respondents slightly outnumbered female respondents in both groups. Among school heads, 56% were male and 44% were female. Among teachers, 60.47% were male and 39.53% were female.

The groups also differed in civil status. Most school heads were married (96%), whereas most teachers were single (62.79%). Educational attainment showed another distinction. Most school heads had completed or were pursuing graduate studies, while many teachers had completed master's or doctoral degrees.

In terms of position, most school heads were Principal I or Principal II, while 69.77% of teachers held the position of Teacher III. All respondents had received an outstanding rating in their latest performance evaluation according to the study records. Length of service also differed between the groups, with school heads generally having longer service than teachers.

These characteristics indicate that the two respondent groups occupied different professional and career positions. Such differences are relevant when interpreting their perceptions of students' mathematics learning.

Both groups perceived Grade 11 students as having a high level of conceptual understanding. School heads reported an average weighted mean of 4.12, while teachers reported 3.97. School heads particularly rated students highly in their understanding and use of mathematical concepts. Teachers similarly viewed students as strong in basic mathematical concepts and in interpreting mathematical symbols and representations.

However, weaker areas were identified. Teachers gave lower ratings to students' understanding of mathematical words and definitions, while recognition of misconceptions and generalization of mathematical concepts also emerged as areas needing attention.

The results are consistent with the view that mathematical proficiency involves more than obtaining correct answers. NCTM (2014) emphasized conceptual understanding as an essential component of meaningful mathematical learning. The findings therefore suggest that although students demonstrated a generally strong conceptual foundation, instruction could place greater emphasis on explaining concepts, recognizing misconceptions, and transferring knowledge across contexts.

Procedural proficiency was also rated high. School heads obtained an average weighted mean of 4.01, while teachers obtained 4.17.

School heads rated the correct application of formulas and algorithms highly, whereas teachers gave their highest rating to students' ability to follow correct procedural steps. Both groups identified strengths in the application of mathematical formulas, logical sequences, and procedures. Lower ratings appeared in areas such as checking the accuracy of solutions, executing complex multistep procedures, and manipulating algebraic expressions.

These findings support the view of mathematical proficiency as involving procedural fluency together with conceptual understanding (Mullis et al., 2016). The results also suggest that students may benefit from activities requiring them to explain why procedures work rather than simply reproduce prescribed steps.

School heads rated students' problem-solving ability at 4.07, or high, whereas teachers gave an average weighted mean of 4.21, interpreted as very high.

School heads rated students particularly highly in identifying relevant information in problem situations and persisting with complex tasks. Teachers gave higher ratings to students' ability to modify strategies when initial attempts failed, analyze word problems, evaluate the reasonableness of solutions, and solve unfamiliar problems.

The lowest ratings from school heads concerned solving non-routine problems and modifying strategies following unsuccessful attempts. This distinction is important. Routine

procedural competence does not necessarily guarantee flexibility in unfamiliar situations. Problem-solving instruction should therefore expose students to non-routine problems that require strategy selection, evaluation, and revision.

Mathematical reasoning received an average weighted mean of 4.03 from school heads and 4.47 from teachers. School heads rated students highly in identifying errors, maintaining logical consistency, and providing mathematical evidence. Teachers gave particularly high ratings to students' ability to make mathematical generalizations, justify answers through logical reasoning, and use logical arguments during mathematical discussions.

The comparatively lower ratings from school heads concerned the explanation and justification of reasoning. This suggests that students may possess mathematical knowledge but may need additional opportunities to articulate the reasoning behind their solutions. Such opportunities are consistent with NCTM's (2014) emphasis on reasoning and communication as essential components of mathematical proficiency.

Students were perceived to have positive interest and motivation toward mathematics. School heads reported an average weighted mean of 4.17, interpreted as agree, whereas teachers reported 4.56, interpreted as strongly agree.

School heads particularly recognized students' intrinsic motivation, willingness to participate in mathematics-related activities, and desire to complete mathematics activities. Teachers gave especially high ratings to curiosity, willingness to pursue mathematical tasks, and asking questions to deepen understanding.

The findings support Ma and Kishor's (1997) observation that attitudes toward mathematics are associated with mathematics achievement. They also correspond with expectancy-value theory, which holds that students' motivation is influenced by their expectations of success and the value they assign to learning activities (Wigfield & Eccles, 2000).

Confidence was rated positively by both groups. School heads reported an average weighted mean of 4.08, while teachers reported 4.56. School heads particularly perceived that students believed they could improve their mathematics performance through effort and were willing to attempt challenging tasks. Teachers reported stronger perceptions of students' resilience, independent problem-solving, positive mathematical self-image, and confidence in difficult situations.

These findings are consistent with Bandura's (1997) self-efficacy theory. Students who believe they can improve through effort are more likely to persist and engage with difficult tasks. The difference between the two respondent groups, however, suggests that teachers and school heads may observe different aspects of students' confidence.

School heads rated students' persistence at 4.19, while teachers reported 4.47. Both groups agreed that students continued working despite mathematical difficulties, sought solutions after making mistakes, and demonstrated resilience. Teachers reported particularly strong perceptions of students' persistence in difficult problems, concentration on multistep problems, and willingness to use different strategies. School heads gave comparatively lower ratings to students' tendency not to give up on complex questions and their effort to complete challenging tasks.

Persistence is an important component of self-efficacy because students' beliefs about their capabilities influence how long they sustain effort in challenging situations (Bandura, 1997). The findings therefore reinforce the importance of learning environments that allow students to experience difficulty without treating mistakes as failure.

The perceived value of mathematics was strongly positive. School heads reported an average weighted mean of 4.39, while teachers reported 4.41. Both groups agreed that students

regarded mathematics as important for academic success and applicable to real-world situations.

School heads particularly emphasized mathematics as an important senior high school subject and its contribution to academic success and informed decision-making. Teachers gave particularly high ratings to mathematics as a tool for logical thinking and its application to real-world academic problems. These results are consistent with expectancy-value theory (Wigfield & Eccles, 2000). When students perceive mathematics as useful and relevant, they have stronger reasons to invest effort in learning it.

Classroom participation was perceived as very high by both groups. School heads reported an average weighted mean of 4.62, while teachers reported 4.39. School heads particularly observed strong engagement in group activities, problem-solving activities, and students' willingness to ask questions. Teachers similarly reported high participation, attentiveness, and involvement in classroom discussions.

The findings indicate that Grade 11 students were perceived as active participants rather than passive recipients of mathematics instruction. This pattern is consistent with constructivist perspectives, which view learning as an active process involving interaction with content, experience, and others (Piaget, 1972; Vygotsky, 1978).

Students were also rated very highly in completing mathematics-related requirements. School heads reported 4.44, while teachers reported 4.37. School heads particularly emphasized diligence, homework completion, and responsiveness to feedback. Teachers placed greater emphasis on compliance with instructions, completion of performance tasks, timeliness, and effort.

The findings suggest that students generally demonstrated responsibility in meeting mathematics-related requirements. However, the lower school-head ratings for consistency and effort indicate that these areas should continue to receive attention.

Assessment performance was rated very high. School heads reported an average weighted mean of 4.49, while teachers reported 4.35. School heads particularly rated students highly in applying learned concepts during assessments, improving examination results, and performing in unit tests. Teachers likewise reported high levels of conceptual application, time management, quiz performance, and mastery of mathematics topics.

The findings suggest strong perceived performance across formal assessments. However, because these ratings were based on the perceptions of school heads and teachers rather than standardized test scores, they should be interpreted as perceived academic performance rather than direct measures of mathematics achievement.

The application of mathematics in academic activities was also rated very high. School heads reported 4.43, while teachers reported 4.35. School heads particularly emphasized students' transfer of mathematical learning to academic tasks and data analysis. Teachers placed strong emphasis on interdisciplinary applications and the use of mathematics in real-world academic problems. The findings are consistent with the broader conception of mathematics proficiency as the ability to apply knowledge across different situations (Mullis et al., 2016; OECD, 2018). They also reinforce the importance of contextualized mathematics instruction that connects mathematical concepts with academic and practical situations.

The study reported no significant difference between school heads' and teachers' perceptions of students' mathematics proficiency and performance. The two groups therefore generally agreed in their assessment of students' cognitive competence and academic performance. A significant difference was reported, however, in their perceptions of students' attitudes toward mathematics ($p = .03024$). This finding suggests that the two groups viewed students' affective characteristics differently even though they largely agreed about proficiency and performance.

The difference may reflect the distinct contexts in which school heads and teachers observe students. Teachers interact with students more directly during mathematics lessons and may therefore observe day-to-day motivation, confidence, persistence, and engagement. School heads may base their perceptions on broader school-level observations.

Statistical reporting note. The original manuscript reports p = 1.17367 for the mathematics-proficiency comparison while simultaneously classifying the result as nonsignificant. Because a p-value cannot exceed 1, this value should be verified against the original statistical output before submission. The reported conclusion of no significant difference should not be retained in the final journal version until the underlying t-test output has been checked.

CONCLUSION

The study showed that Grade 11 students were perceived to possess high mathematics proficiency, positive attitudes toward mathematics, and very high mathematics performance. School heads and teachers generally agreed that students demonstrated strengths in conceptual understanding, procedural skills, problem solving, mathematical reasoning, classroom participation, task completion, assessment performance, and application of mathematics in academic activities.

Students also demonstrated favorable affective characteristics. They were perceived as interested in mathematics, confident in learning it, persistent when facing challenges, and aware of its academic and practical value. These findings support the importance of addressing cognitive and affective dimensions together in mathematics education.

The findings further showed substantial agreement between school heads and teachers regarding mathematics proficiency and performance. Their perceptions differed significantly, however, regarding students' attitudes toward mathematics. This difference warrants closer attention because attitudes, confidence, motivation, and persistence are closely related to students' engagement with challenging mathematical tasks.

Based on these findings, mathematics teachers should continue strengthening conceptual understanding while providing opportunities for students to identify misconceptions, generalize mathematical ideas, and justify their solutions. Instruction should also include non-routine problems that require students to select, modify, and evaluate problem-solving strategies. Classroom activities should provide opportunities for mathematical discussion, reasoning, collaboration, and application to authentic situations.

Teachers should likewise sustain strategies that promote curiosity, confidence, persistence, and the perceived relevance of mathematics. Constructive feedback and collaborative learning activities may help maintain students' engagement and responsibility in completing mathematical tasks. At the school level, professional development should support teachers in integrating formative assessment, metacognitive strategies, contextualized instruction, and problem-solving approaches.

Finally, future studies should examine these variables using direct measures of student proficiency and academic performance, together with validated attitude scales. Studies involving larger and more diverse samples may also determine whether the patterns observed in this study extend to other senior high school settings.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. David McKay.

Carroll, J. B. (1963). A model of school learning. Teachers College Record, 64(8), 723–733.

Department of Education. (2013). K to 12 basic education curriculum framework. Republic of the Philippines.

Ma, X., & Kishor, N. (1997). Attitude toward self, social factors, and achievement in mathematics: A meta-analytic review. Educational Psychology Review, 9(2), 89–120.

Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). TIMSS 2015 international results in mathematics. TIMSS & PIRLS International Study Center, Boston College.

National Council of Teachers of Mathematics. (2014). Principles to actions: Ensuring mathematical success for all. NCTM.

Organisation for Economic Co-operation and Development. (2019). PISA 2018 results (Volume I): What students know and can do. OECD Publishing.

Piaget, J. (1972). The psychology of the child. Basic Books.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. Contemporary Educational Psychology, 25(1), 68–81.