

A Predictive Model for Junior High School Mathematics Performance: Examining Internal and External Determinants

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Abstract

This study assessed the internal and external determinants affecting junior high school mathematics performance among public secondary school students in Dalaguete I District, Cebu, during the school year 2024–2025. Anchored on Bandura's Social Cognitive Theory and Weiner's Attribution Theory, the study examined how psychological, environmental, school-related, teacher-related, and family-related factors influenced students' mathematics achievement. The research utilized a multiple regression design involving 800 junior high school students from four public secondary schools selected through volunteer sampling. Data were gathered using an adapted survey questionnaire with a Cronbach's alpha value of 0.971, along with students' diagnostic and quarterly mathematics assessment scores. Statistical tools such as weighted mean, Spearman Rho, and Multiple Regression Analysis were employed using SPSS. Findings revealed that students generally demonstrated high levels of learning engagement, motivation, self-efficacy, and positive attitudes toward mathematics, although mathematics anxiety remained evident. External determinants, particularly motivational strategies and behavior management strategies, significantly contributed to mathematics performance. Results further showed significant improvement in students' quarterly assessment performance compared to diagnostic test results. The predictive model indicated that both internal and external determinants collectively influenced mathematics achievement, with motivational strategies emerging as the strongest predictor. The study concluded that mathematics performance is shaped by the interaction of students' internal dispositions and external educational support systems. It recommended the implementation of development programs that strengthen student motivation, engagement, classroom management, and school support systems to improve mathematics learning outcomes. The study supports Sustainable Development Goal (SDG) 4 or Quality Education by promoting improved mathematics learning outcomes through learner-centered and evidence-based educational interventions. It also aligns with SDG 10 or Reduced Inequalities by addressing socio-economic and educational factors influencing student achievement. The study contributes to educational and institutional sustainability by supporting evidence-based decision-making, improved instructional practices, and inclusive learning environments that strengthen students' academic performance in mathematics.

Keywords: Academic Performance, External Determinants, Internal Determinants, Junior High School, Learning Engagement, Mathematics Achievement, Motivational Strategies, Predictive Model, Self-Efficacy, Test Anxiety

1. Introduction

Mathematics remains a fundamental discipline in global education systems and serves as a key indicator of academic competence in international assessments such as the Programme for International Student Assessment (PISA). The consistently low performance of Filipino learners in mathematics highlights persistent concerns regarding students' competencies and learning outcomes. In the District of Dalaguete, public secondary schools recorded a Mean Percentage Score (MPS) of 70.34 over the past three years, which remains below the Department of Education (DepEd) passing standard. These outcomes suggest that students encounter various internal and external determinants that influence their mathematics performance. Previous studies identified mathematics anxiety, low motivation, weak conceptual understanding, limited interest, and environmental factors as contributors to poor academic achievement (Abusalih, 2022; Mastoni, et al., 2019; Acharya, 2017). Although several studies have explored determinants of academic achievement, many examined these variables independently and relied mainly on correlational approaches rather than predictive analyses (Flores & Salimaco Jr., 2025, Djekourmane, et al., 2024, Bacabac, 2017). Limited studies have specifically focused on junior high school mathematics performance and the combined influence of internal and external determinants. Hence, this study assessed the determinants affecting junior mathematics performance among public secondary school students in Dalaguete I and aimed to develop an intervention program based on the findings.

1.1 Internal and External Determinants of Junior High School Mathematics Performance in Dalaguete I Public Secondary Schools

Mathematics is regarded as one of the most challenging subjects among learners, particularly in public secondary schools where low achievement remains evident (Mastoni, et al., 2019). Learners' underachievement in mathematics has been associated with factors such as anxiety, low interest, inadequate mastery of concepts, and poor learning environments (Abusalih, 2022; Acharya, 2017). Interest significantly influences students' attention, engagement, and persistence in learning activities (Amaral, et al., 2023). Learners with strong interest in mathematics tend to demonstrate better academic performance and higher classroom participation (Mazana et al., 2020; Tomé et al., 2022). The transition and implementation of the K–12 curriculum also introduced adjustments in mathematics instruction that may affect learners' adaptability and performance. The curriculum changes increased the demands placed on students and highlighted the need to examine both personal and environmental factors affecting mathematics achievement. The study therefore focused on determining how internal and external determinants influence junior high school students' mathematics performance and how these findings can guide the development of appropriate educational interventions.

1.2 Related Literature on Interest, Self-Efficacy, Motivation, Learning Environment, and Mathematics Performance among Junior High School Learners

Existing literature emphasizes that mathematics achievement is influenced by interconnected internal and external determinants. Internal determinants include interest, self-efficacy, motivation, learning environment, attitude toward mathematics, and test anxiety. Interest encourages active participation and persistence in solving mathematical problems (Amaral, et al., 2023). Students who demonstrate positive attitudes toward mathematics are more likely to engage in learning tasks and sustain academic motivation (Mazana et al., 2023). Self-efficacy also plays a critical role in students' confidence and willingness to perform mathematical tasks. Learners with stronger self-efficacy are more resilient in overcoming academic challenges (Celik, 2021). Conversely, students experiencing anxiety and fear of failure often exhibit lower achievement and weaker problem-solving abilities (Dela Cruz & Dela Cruz, 2022). Motivation, emotional stability, and supportive instructional practices are therefore essential in enhancing students' mathematics performance (Abusalih, 2022). External determinants include teacher-related, school-related, and family-related factors. Effective instructional strategies, supportive classroom environments, and accessible learning resources positively influence mathematics learning (Acharya, 2017; Kasawneh et al., 2023). School conditions such as adequate facilities and academic support systems also contribute to improved student performance, while resource limitations may hinder achievement. Family involvement, parental educational attainment, and socio-economic status further affect students' academic engagement and access to educational support (Kunwar, 2020; Bernardo, 2020). Demographic variables such as age and gender were likewise identified as influential determinants. Age affects cognitive development and learning capability, while gender-related stereotypes and social judgments may influence students' academic self-concept in mathematics (Zubković, et al., 2021; Valls, 2022). These findings demonstrate that mathematics achievement is shaped by multiple interacting determinants rather than isolated variables.

1.3 Local, National, and Global Context of Junior High School Mathematics Achievement and Educational Performance

Globally, mathematics achievement remains a major educational concern, particularly in international assessments where Filipino learners consistently perform below global standards. This reflects broader challenges in mathematics education within the Philippine educational system. Nationally, the implementation of the K–12 curriculum under Republic Act No. 10533 aimed to improve the quality and competitiveness of Philippine education through curriculum enhancement and learner-centered instruction. At the local level, the District of Dalaguete recorded low mathematics performance among public secondary school learners, indicating the need for targeted educational interventions. The low Mean Percentage Score (MPS) suggests that students continue to struggle with mathematics competencies due to academic, environmental, and socio-economic determinants. These realities underscore the urgency of identifying predictors of mathematics achievement and developing evidence-based programs to support learners.

1.4 Theoretical and Legal Foundations of Internal and External Determinants Affecting Junior High School Mathematics Performance

This study was anchored on the Social Cognitive Theory of Albert Bandura (1970) and the Attribution Theory of Bernard Weiner (1985). Social Cognitive Theory explains that learning results from the interaction between personal, behavioral, and environmental determinants through reciprocal determinism. The theory emphasizes that students' motivation, persistence, and academic performance are shaped by both internal dispositions and external influences. It further suggests that collaborative support from stakeholders can improve students' critical thinking and problem-solving abilities in mathematics (Li et al., 2021). Attribution Theory explains how individuals interpret success and failure through internal or external causes. Students who attribute mathematics achievement to internal factors such as ability and effort are more likely to remain motivated and perform positively, whereas attributing failure to uncontrollable factors may lead to helplessness and poor achievement (Graham, 2020). The study was likewise supported by Republic Act No. 10533 or the Enhanced Basic Education Act of 2013, DepEd Order No. 055 s. 2016 on the National Assessment of Student Learning,

and DepEd Order No. 021 s. 2019 on the K to 12 Basic Education Program. These policies emphasize learner-centered instruction, assessment improvement, curriculum relevance, and the enhancement of students' academic performance through supportive educational environments.

1.5 Research Gaps on Predictive Determinants of Junior High School Mathematics Performance in Public Secondary Schools

Previous studies commonly examined internal and external determinants separately and focused mainly on correlational relationships rather than predictive analyses (Flores & Salimaco Jr., 2025, Djekourmane, et al., 2024, Bacabac, 2017). Limited research has explored the combined influence of demographic, psychological, school-related, and family-related determinants on junior high school mathematics performance. Additionally, few studies have concentrated specifically on public secondary schools within the local context of Dalaguete. This study addressed these gaps by investigating the relationship between internal and external determinants and students' mathematics performance. It also aimed to establish a predictive model and develop an intervention program that may improve mathematics achievement among junior high school learners.

1.6 Alignment of the Study on Mathematics Performance with Relevant Sustainable Development Goals (SDGs)

This study aligns primarily with SDG 4 – Quality Education by promoting inclusive and equitable quality education through improved mathematics learning outcomes. By identifying determinants affecting mathematics performance, the study supports the enhancement of teaching practices, learning environments, and student engagement. The study also relates to SDG 8 – Decent Work and Economic Growth because improved mathematics competencies contribute to learners' future employability, productivity, and entrepreneurial readiness. In addition, the study supports SDG 10 – Reduced Inequalities by addressing socio-economic and educational disparities that affect students' access to quality learning experiences. The focus on learner-centered instruction, supportive educational environments, and evidence-based interventions further contributes to sustainable educational development and long-term academic improvement.

1.7 Contribution of the Study on Mathematics Performance to Multidisciplinary Sustainability

The study contributes to educational sustainability by supporting the development of effective instructional strategies and learner-centered interventions that improve mathematics achievement. It also contributes to socio-economic sustainability by recognizing the influence of socio-economic status, parental involvement, and school support on academic success. The findings may assist administrators, teachers, parents, and policymakers in creating programs that strengthen students' motivation, self-efficacy, and learning environments. Furthermore, the study contributes to institutional sustainability by encouraging evidence-based decision-making in curriculum implementation and assessment practices. By addressing psychological, social, educational, and environmental determinants of mathematics achievement, the study promotes holistic and sustainable approaches to improving academic performance among junior high school learners.

2. Material and methods

2.1 Research Design

The study utilized a multiple regression research design to determine the association and predictive relationship between internal and external determinants and students' academic performance in junior high school mathematics. The variables investigated included psychological and environmental determinants affecting mathematics achievement. The study examined these relationships without manipulating the natural learning environment, allowing the researcher to analyze how the identified variables influence students' mathematics performance within classroom instruction. The research process involved securing permissions, gathering data through survey questionnaires and assessment results, statistically analyzing the data using SPSS, and developing conclusions and recommendations for a mathematics development program.

2.2 Locale of the Study

The study was conducted in Dalaguete I District, Cebu, specifically in four public secondary schools: Caliongan National High School, Caleriohan National High School, Dalaguete National High School, and Mantalongon National High School. These schools were selected because they were accessible to the researcher, had Mean Percentage Scores (MPS) in mathematics below the DepEd standard of 75%, and demonstrated the possible presence of internal and external determinants affecting mathematics learning among junior high school students. Dalaguete is a coastal municipality in Cebu Province with a territorial area of 154.96 square kilometers. The municipality is known for its agricultural products, particularly vegetables from the highlands, as well as tourist destinations and beaches. The locale provided an appropriate setting for examining mathematics performance among public secondary school learners.

2.3 Respondents of the Study

The respondents of the study were 800 junior high school students enrolled in Grades 7 to 10 in the four public secondary schools of Dalaguete I District during the school year 2024–2025. Equal representation was observed across grade levels and schools to minimize bias and ensure balanced participation. Both male and female students officially enrolled and who

had completed at least two grading periods in mathematics were included in the study. Students were required to understand and respond appropriately to the research instruments. Those identified with learning disabilities that could significantly affect mathematics performance, students with incomplete responses, and students absent during the data gathering period were excluded to maintain consistency and validity in the study.

2.4 Sample and Sampling Procedure

The study employed non-probability sampling, specifically volunteer or self-selection sampling, wherein students voluntarily participated in the research. The sample size of 800 respondents was based on the heuristic recommendation for descriptive correlational studies as mentioned by Lunenberg and Irby. Equal distribution of respondents across grade levels and schools was observed to reduce bias and ensure adequate representation of the target population. The inclusion criteria covered officially enrolled junior high school students from Grades 7 to 10 who had completed at least two grading periods in mathematics. Exclusion criteria included students with learning incapacities affecting mathematics performance, students with incomplete survey responses, and those absent during data collection.

2.5 Research Instrument

The study utilized an adapted survey questionnaire gathered from various sources to obtain the necessary data based on the research objectives. The instrument underwent reliability testing using Cronbach's Alpha through the Statistical Package for Social Sciences (SPSS). The results revealed a Cronbach's alpha value of 0.971, indicating excellent internal consistency and reliability of the instrument. The questionnaire consisted of two sections. The first section focused on the demographic profile of the respondents, while the second section examined the internal and external determinants affecting junior high school mathematics performance. Responses were measured using a five-point Likert scale ranging from Strongly Agree to Strongly Disagree. Secondary data such as diagnostic and quarterly assessment scores in mathematics were also collected to measure students' academic performance.

2.6 Data Gathering Procedure

The researcher secured permission from the Schools Division Superintendent and the Public Schools District Supervisor of Dalaguete I before conducting the study. After approval of the transmittal letter, the researcher coordinated with school heads and distributed the survey questionnaires personally to the respondents. Necessary instructions regarding the study and questionnaire completion were explained to the students prior to administration. The respondents were assured that all gathered information would be treated with confidentiality and used solely for research purposes. Students were given sufficient time to answer the questionnaire, and diagnostic as well as quarterly assessment results were collected from the schools. After data collection, all quantitative data were tabulated, analyzed, and interpreted using SPSS software. The findings served as the basis for crafting the proposed development program in mathematics instruction.

2.7 Data Analysis Techniques

The study employed several statistical tools to analyze the gathered data. Simple percentage was used to determine the demographic profile of the respondents. Weighted mean was utilized to examine the internal and external determinants affecting mathematics performance. Spearman Rho and Multiple Regression Analysis were used to determine the significant relationships among internal determinants, external determinants, and students' academic performance. The interpretation of respondents' perception levels was based on a five-point scale ranging from Strongly Agree to Strongly Disagree. Diagnostic and quarterly assessment scores were categorized according to performance descriptors such as Outstanding, Very Satisfactory, Satisfactory, Fairly Satisfactory, and Did Not Meet Expectations. Correlation coefficients were also interpreted using categories ranging from negligible to very strong relationships.

3. Results and Discussion

3.1 Demographic Profile of the Respondents

3.1.1 Age of the Respondents

The findings revealed that most respondents were aged 13–14 years old, comprising 52.25% of the total population, while only 0.75% belonged to the 19–20+ age bracket. This indicates that the majority of participants were within the typical age range for junior high school students. The result suggests that younger learners dominate the junior high school population and are more actively engaged in mathematics learning. This finding supports the study of Zubkovic, Pahljina-Reicnic and Kolic-Vehovec (2021), who stated that younger students tend to perform better academically. Likewise, Haavold (2018) emphasized that higher achievers in junior high school are often more academically creative than those in senior high school.

3.1.2 Gender of the Respondents

The data showed that female respondents comprised 55.50% of the participants, while males represented 44.50%. This indicates a higher participation rate among female students during the conduct of the study. The higher representation of female respondents may reflect greater willingness to participate in academic activities. However, Zubkovic, Pahljina-

Reicnic and Kolic-Vehovec (2021) noted that male students often exhibit more positive mathematics self-concepts despite females demonstrating stronger participation in learning activities.

3.1.3 Socio-Economic Status of the Respondents

Most respondents belonged to low-income and lower middle-income families, accounting for 88.38% of the population. Only a very small percentage came from upper-income families. The findings imply that many learners come from economically disadvantaged backgrounds, which may affect their access to educational resources and academic support. Tomaszewski, Xiang, and Western (2020) explained that students from low socio-economic backgrounds are less likely to adopt effective learning strategies that contribute to higher academic achievement.

3.1.4 Parents' Educational Background

The majority of respondents' parents were high school graduates, while only a few reached college-level education or graduated from college. This indicates that most students come from households with limited exposure to higher education. Such educational backgrounds may influence parental support and expectations toward mathematics learning. Idris et al. (2020) emphasized that parents with higher educational attainment positively contribute to their children's academic success.

3.2 Internal Determinants Affecting Mathematics Performance

3.2.1 Interest in Mathematics

Students demonstrated a neutral level of interest toward mathematics, with a moderate perception of the subject. Learners generally agreed that mathematics is interesting, although many still perceived it as difficult to understand. The findings suggest that while students recognize the importance of mathematics, their enthusiasm toward the subject remains moderate. In line with Weiner's Attribution Theory, students who perceive mathematics as difficult may attribute failure to uncontrollable external factors rather than personal effort. Kadarisma, Rosyana & Nurjaman (2019) similarly found that mathematics is often perceived as difficult, resulting in lower student interest.

3.2.2 Self-Efficacy in Mathematics

Students generally demonstrated a high level of self-efficacy in mathematics. Most respondents strongly believed they could learn mathematical concepts taught by their teachers, although some were uncertain about solving difficult mathematical problems independently. The results indicate that students possess confidence in learning mathematics, especially when teacher guidance is present. Bandura's Social Cognitive Theory explains that self-efficacy significantly influences students' persistence and learning behavior. Negara, et al. (2021) and Zakariya, et al. (2020) also found that high self-efficacy contributes positively to mathematics achievement and deeper learning approaches.

3.2.3 Motivation in Learning Mathematics

Students exhibited a high level of motivation toward mathematics learning. They reported exerting effort and using strategies to understand mathematical concepts effectively. The findings indicate that learners are motivated more by personal growth and understanding rather than competition with peers. This reflects RA 10533's emphasis on learner-centered and competency-based education. Zebua et al. (2022) found that higher learning motivation positively affects mathematical problem-solving abilities.

3.2.4 Learning Engagement

The respondents showed high engagement in mathematics learning, particularly in listening to teachers, participating in discussions, and seeking assistance when necessary. However, some students admitted being easily distracted during class. The findings suggest that students actively participate in mathematics learning and value collaborative support. DO 021, s. 2019 emphasizes learner-centered pedagogies that encourage engagement and critical thinking. Mentari & Syarifuddin (2020) also concluded that teacher interventions and learning tools increase student engagement in mathematics.

3.2.5 Attitude Toward Mathematics

Students generally demonstrated positive attitudes toward mathematics and expressed a strong desire to improve their mathematical skills. However, many still struggled with solving mathematical problems without difficulty. The results imply that students recognize the value of mathematics despite perceiving problem-solving as challenging. Attribution Theory suggests that students who associate success with persistence are more likely to sustain positive attitudes toward learning. Masek, et al. (2023) similarly reported high levels of positive attitudes toward mathematics among learners.

3.2.6 Test Anxiety

Students exhibited a high level of mathematics test anxiety. Many worried about failing mathematics examinations and the effect of grades on their academic performance. The findings indicate that mathematics assessments create emotional pressure among learners. However, students did not necessarily dislike taking mathematics tests. DO 055, s. 2016 highlights

the importance of learner-sensitive assessment practices that minimize anxiety. Gabriel, et al. (2020) also found that mathematics anxiety negatively affects perseverance and self-efficacy in learning mathematics.

3.3 External Determinants Affecting Mathematics Performance

3.3.1 Teacher-Related Factors

Students strongly agreed that teachers effectively utilized instructional strategies in mathematics classes. They recognized that teachers explained concepts clearly, guided students through mathematical methods, and prepared lessons effectively. The findings imply that instructional strategies significantly influence students' engagement and mathematics achievement. DO 021, s. 2019 promotes learner-centered teaching approaches that accommodate diverse learning needs. Cardino & Dela Cruz (2020) similarly concluded that instructional strategies positively influence mathematics performance.

3.3.2 Behavior Management Strategies

Students perceived their teachers as effective classroom managers who monitored classroom performance and maintained positive learning environments. However, teacher-parent communication was perceived as less consistent. The results suggest that classroom management contributes positively to mathematics learning by maintaining order and promoting participation. Bandura's Social Cognitive Theory highlights the importance of environmental reinforcement in shaping learning behavior. Marder et al. (2023) and Tacadena (2021) likewise found significant relationships between classroom management and mathematics achievement.

3.3.3 Motivational Strategies

Students positively recognized teachers' motivational strategies, especially the connection of mathematics lessons to real-life situations. However, some learners were uncertain whether conceptual understanding was emphasized more than memorization. The findings suggest that meaningful and relevant instruction strengthens students' intrinsic motivation. Attribution Theory explains that emphasizing controllable factors such as effort and strategy use increases student motivation. Adel & Hussain (2020) also reported a positive relationship between motivation and academic performance.

3.3.4 Learning Resources

Students generally agreed that learning materials and instructional resources supported mathematics learning. However, they still perceived mathematics as a difficult subject despite the availability of resources. The findings imply that engaging instructional materials improve understanding and satisfaction in learning mathematics. RA 10533 emphasizes the provision of quality and learner-centered instructional resources. Tañola & Lomibao (2024) highlighted that contextualized and technology-integrated learning resources strengthen students' critical thinking and problem-solving abilities.

3.3.5 Learning Environment

Students perceived the learning environment as supportive, collaborative, and conducive to mathematics learning. However, they suggested that classrooms could become more visually stimulating and interactive. The findings indicate that collaborative and respectful environments improve mathematics engagement. DO 021, s. 2019 supports interactive and learner-centered educational spaces. Daucourt et al. (2021) also emphasized that environmental factors reinforce mathematics learning through social interactions.

3.3.6 School Support

Students recognized the supportive role of schools in mathematics learning through activities, teacher support, and technology integration. Nevertheless, students perceived limited access to workshops and seminars that strengthen mathematical problem-solving. The findings suggest that school initiatives contribute positively to mathematics engagement and achievement. DO 055, s. 2016 emphasizes interventions that support student learning beyond assessment practices. Yang, et al. (2021) likewise found that positive school-student interactions improve mathematics performance.

3.3.7 Parents' Involvement

Students generally perceived their parents as supportive of their mathematics learning through encouragement and motivation. However, parents were less likely to provide interactive mathematical resources at home. The findings imply that parental encouragement strengthens students' effort and persistence in mathematics. Attribution Theory explains that support systems reinforcing effort increase motivation and achievement. Wang & Wei (2024) also found that parental involvement positively influences mathematics performance.

3.3.8 Home Environment

Students viewed their home environments as supportive of mathematics learning, particularly through praise, encouragement, and provision of study time. However, families rarely promoted recreational mathematics activities. The findings indicate that positive home reinforcement contributes to students' motivation and mathematics achievement. Social Cognitive Theory explains that home environments shape learning through reinforcement and observational

learning. Daucourt et al. (2021) also emphasized that home mathematics environments positively affect children's mathematics achievement.

3.4 Mathematics Performance in Junior High School

The results showed significant improvement in students' mathematics performance from the diagnostic assessment to the quarterly assessment. Most students initially fell under the "Did Not Meet Expectations" category during the diagnostic test, but many later achieved "Very Satisfactory" and "Outstanding" ratings during the quarterly assessment. The findings indicate that instructional interventions, support systems, and teaching strategies implemented throughout the quarter were effective in improving mathematics achievement. Wang and Sperling (2020) also revealed that interventions targeting multiple learning strategies improve mathematics achievement and self-regulated learning.

3.5 Relationship Between Internal and External Determinants

The findings revealed that motivation, learning engagement, and test anxiety consistently predicted teacher-related, school-related, and family-related factors. Motivation emerged as the strongest predictor across several models, while interest and self-efficacy were generally weak predictors. The results imply that students' motivation and active engagement significantly shape how they perceive support from teachers, schools, and families. Cardino & Dela Cruz (2020), Yang et al. (2021), and Wang & Wei (2024) similarly found that instructional practices, school environments, and family support significantly influence mathematics achievement.

3.6 Relationship Between Determinants and Academic Performance

The findings revealed that learning engagement, attitude toward mathematics, test anxiety, behavior management strategies, motivational strategies, learning environment, and school support demonstrated relationships with mathematics performance. External determinants showed stronger and more significant relationships with academic performance than internal determinants. The results suggest that classroom management, school support, and motivational teaching strategies play major roles in improving mathematics achievement. Navarro et al. (2020), Arifin et al. (2024), and Mosia et al. (2025) also found that both internal and external determinants contribute to students' mathematics performance.

3.7 Predictive Model for Mathematics Performance

The predictive model revealed that both internal and external determinants collectively influence junior high school mathematics performance. Motivational strategies emerged as the strongest predictor, followed by behavior management strategies, learning environment, test anxiety, and school support. The findings indicate that academic success in mathematics is influenced by the interaction of personal motivation, supportive classroom management, and positive school environments. Wang et al. (2024), Ryan & Deci (2020), Patall et al. (2023), and Lopez-Martin et al. (2023) emphasized that autonomy-supportive instruction and structured classroom management improve mathematics achievement. The study further highlighted the importance of balancing internal student motivation with external educational support systems in achieving SDG 4 or Quality Education.

4. Conclusion & Recommendations

The study found that both internal and external determinants significantly influenced the mathematics performance of junior high school students in Dalaguete I public secondary schools. Internal factors such as learning engagement and test anxiety positively affected academic performance, while attitude toward mathematics showed a negative influence. External factors, particularly motivational and behavior management strategies, positively contributed to students' performance, whereas learning environment and school support demonstrated negative effects. The findings further revealed that students generally performed better in quarterly assessments compared to diagnostic tests, indicating improved engagement and learning outcomes in mathematics.

It is recommended that schools implement development programs that strengthen students' learning engagement and intrinsic motivation to improve mathematics performance. Teachers should continue enhancing motivational and behavior management strategies through professional development and training. In addition, schools should evaluate and improve existing support systems and learning environments to ensure that these effectively address the academic needs of students in mathematics.

The study was limited to 800 junior high school students enrolled in public secondary schools in Dalaguete I during the school year 2024–2025. The research focused only on selected internal and external determinants affecting mathematics performance using quantitative methods and data gathered through survey questionnaires, diagnostic scores, and quarterly assessments. Therefore, the findings may not fully represent students from other grade levels, private institutions, or different educational settings.

Compliance with ethical standards

The study adhered to established research procedures in the conduct of data gathering and analysis. Permission to conduct the study was secured from the Schools Division Superintendent and the Public Schools District Supervisor of Dalaguete I prior to data collection. Coordination with school heads was also undertaken before the administration of the survey questionnaires. The respondents were informed about the purpose of the study and were given sufficient time to complete the questionnaire. All gathered information was treated with confidentiality and used solely for research purposes.

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