**The Relationship Between Growth Mindset and Mathematics Achievement**



**Abstract**

This study examines the relationship between a growth mindset and mathematical performance among seventh-grade students at Tambobong National High School in Davao City. The researchers employed a descriptive-correlational research design and selected 100 students via stratified random sampling to guarantee representation from various sections. Data regarding students' beliefs were gathered using a modified Growth Mindset Scale by Dweck (2006), which comprises Likert-type items assessing students' perceptions of the malleability of intelligence. The evaluation of mathematics performance was conducted through the students' final grades in the subject, as recorded in school documentation. Descriptive statistics indicated a mean mindset score of 2.09, interpreted as “Growth Mindset with Some Fixed Ideas,” suggesting that students predominantly perceive abilities as developable, yet maintain certain fixed beliefs. Their mathematics performance yielded a mean general average of 85.8, categorized as “Very Satisfactory.” The Pearson Product-Moment Correlation Coefficient was employed to determine the relationship between the two variables, yielding a moderate yet statistically significant positive correlation (r = 0.219, p < 0.05). This indicates that students possessing more robust growth-oriented beliefs generally achieve superior performance in mathematics. The results corroborate theories connecting mindset, motivation, and academic success, highlighting the importance of integrating mindset development into educational strategies to enhance student performance in mathematics.

*Keywords: Growth mindset; Fixed mindset; Mathematics Achievement; Integrating mindset development*

**Introduction**

The 2018 PISA report revealed that 71.8% of Filipino students failed to meet the minimum basic learning standards, raising serious concerns about education in the Philippines (Alinsunurin, J. 2021). While East Asian countries lead in producing high-performing students, Filipino students are falling far behind their classmates. Additionally, a recent study conducted among junior high school students in East Java, Indonesia, during the 2022 academic year found that while students demonstrated varying levels of mathematical problem-solving ability, many continued to face challenges in applying these skills to real-life and science-related contexts (Nugroho, Sari, & Lestari, 2023). Statistical analyses revealed that there were no significant differences in mathematics achievement based on these demographic factors. Despite the absence of significant relationships, the study emphasized the need to address learning difficulties in mathematics and to improve instruction that fosters students' ability to apply math in practical scenarios (Nugroho, Sari, & Lestari, 2023). Moreover, Repuya (2021) discovered that students underwent significant transformations in their mindsets: some transitioned from a fixed mentality with limited growth-oriented beliefs to a more robust growth mindset, while others who initially possessed a growth mindset exhibited a propensity toward fixed views following the intervention.

In the local context, research by Velez, Dayaganon, Robigid, Demorito, Villegas, & Gomez (2023) at a private college in Tagum City revealed that students encountered considerable difficulties in grasping mathematical concepts. These difficulties included problem analysis, concept comprehension, identifying correct solutions, forming equations, and simplifying expressions (Velez, Dayaganon, Robigid, Demorito, Villegas, & Gomez, 2023). Recently, various factors influencing students' mathematics achievement have been explored; however, comprehensive analyses specific to the Mindanao region have been limited. A meta-analysis by Callaman and Itaas (2020), which reviewed 50 studies, identified key predictors of mathematics success, including proficiency in mathematical skills, positive attitudes toward the subject, and self-efficacy. The analysis also highlighted significant achievement differences between public and private schools, indicating that school type plays a critical role in student outcomes.

 One emerging factor that has gained increasing attention in academic success is the growth mindset—a concept introduced by psychologist Carol Dweck (2006). The growth mindset posits that students can develop their intelligence and abilities through dedication, effort, and effective learning strategies. In contrast, a fixed mindset assumes that intelligence is static and unchangeable. The growth mindset theory is grounded in the incremental theory of intelligence, which posits that students who view ability as malleable are more likely to embrace challenges, persist through difficulties, and ultimately achieve better academic outcomes. Numerous studies have shown that fostering a growth mindset can significantly influence student motivation, resilience, and performance, especially in subjects like mathematics, where students often face frustration and failure.

 Junior high school students begin to face more complex mathematical concepts that require not only cognitive skills but also a strong sense of perseverance and confidence in learning. However, many students at this level struggle with low self-efficacy and fixed beliefs about their abilities, which negatively affect their performance in mathematics. Developing a growth mindset during junior high is, therefore, essential in improving the student’s mathematics achievement. This concept is important because it helps students understand that both intelligence and mathematical ability can improve through effort, practice, and the use of effective strategies. The goal of this study is to provide a significant new understanding of how developing a growth mindset can improve mathematical performance. If these problems are not resolved, low achievement rates could continue, students' future academic and professional options could be restricted, and the nation's advancement in scientific and technological fields vital to its development could be impeded.

*Statement of the Problem:*

This quantitative study examines the connection between math proficiency and a growth mindset in seventh-grade students at Tambobong National High School in Davao City during the academic year 2024-2025. In particular, it aims to answer the following research questions:

1. What is the level of growth mindset among Grade 7 students at Tambobong National High School?
2. What is the level of students' academic achievement in mathematics in terms of their general average at Tambobong National High School?
3. Is there a significant correlation between students' growth mindset and mathematics achievement?

*Hypothesis*

$H\_{0}:$ There is no significant relationship between students' growth mindset and mathematics achievement.

***Theoretical/Conceptual Framework***

Carol Dweck's Theory of Mindsets (2006) serves as the foundation for this investigation. According to this theory, students who have a strong growth mindset think that they can get better at work. These students are also better equipped to overcome challenges and risks, persevere through setbacks, and achieve higher math scores. It highlights how a student's mindset affects how they approach learning and solving problems.

Growth Mindset

Mathematics Achievement

*Figure 1. Conceptual Framework of the Relationship between Growth Mindset and Mathematics Achievement*

**Method**

A quantitative research design—more precisely, a descriptive-correlational design—was used in this investigation. With no active control or manipulation on the part of the researcher, this design investigates the relationships between variables. The strength and direction of the relationship between two or more variables—which could be either positive or negative—are revealed by correlation (Bhandari, 2023). Using quantifiable information obtained from standardized questionnaires and academic performance metrics, this quantitative approach sought to establish the relationship between the independent variable (growth mindset) and the dependent variable (mathematics achievement).

 The survey questionnaire on growth mindset was adapted and validated through expert review to ensure content validity. A pilot test was conducted with 30 junior high school students from a non-participating school. Based on the results, necessary revisions were made for clarity and relevance. The reliability of the questionnaire was measured using Cronbach’s alpha, yielding a value of **0.88**, indicating high internal consistency.

 This study assessed mathematics achievement by utilizing students' overall average in mathematics, as documented in their official school records. This score is deemed a reliable measure of achievement as it encapsulates students' comprehensive performance across multiple assessments—such as quizzes, unit tests, projects, and performance tasks—conducted throughout the grading period. These evaluations conform to the Department of Education's K to 12 curriculum standards and are developed and assessed by certified subject educators.The general average, while not a standardized test, exhibits face validity and criterion-related validity, as it accurately reflects genuine academic performance in real classroom environments. It is broadly recognized in educational research as a dependable measure of academic success, particularly when derived from authenticated school records. The utilization of general averages mitigates testing bias and represents long-term performance rather than a singular test result.

In Davao City, Philippines, at Tambobong National High School, the study was carried out. Because it offered the required setting and participants to investigate the relationship between a growth mindset and mathematical proficiency among students, the school was selected as the implementation site.

Based on their availability, a total of 100 Tambobong National High School Grade 7 students were chosen as responders using purposive sampling. According to the inclusion criteria, the students had to have been enrolled in the 2024–2025 academic year prior. Purposeful sampling, as defined by Etkan, Musa, and Alkassim (2016), is a non-probability sampling technique in which participants are chosen based on specific characteristics relevant to the objectives of the study.

Students' attitudes toward learning and intelligence were evaluated by the researchers using the Growth Mindset Scale. This scale was an adaptation of Dweck's Growth Mindset Questionnaire (Dweck, 2006), which gauges students' support for a growth mindset as opposed to a fixed mindset using four-point Likert scale items. The twenty (20) questions that make up the growth mindset scale are ten (10) questions about growth mindset and ten (10) questions about fixed mindset. The evaluation criteria supplied by Dweck were employed by the researchers to assign scores and assess the responses of the participants. The researchers gave each scale indicator the following points in this criterion: Strongly Agree (1 point), Agree (2 points), Disagree (3 points), and Strongly Disagree (4 points) are the fixed mindset indicators. The growth mindset indicators, on the other hand, are strongly disagree (1 point), disagree (2 points), agree (3 points), and strongly agree (4 points).

Data for this study were collected after obtaining the required approvals. The researchers obtained informed consent from the parents or guardians of the students and asked for permission to conduct the study through a formal request letter. In order to assess their growth mindset, the students were asked to complete a Google Form. Easy access and effective response collection are guaranteed by this online form. Furthermore, with the appropriate authorization, the students' math grades were gathered from their subject teacher to gauge their academic performance. Strict confidentiality was maintained throughout the collection process, and all data was used only for research.

 Both descriptive and inferential statistical tests were employed in this investigation. The average level of students' responses on the Growth Mindset Scale was ascertained by the researchers by computing the mean scores. To investigate the connection between students' growth mindset and their mathematical proficiency, the researchers used Pearson's r correlation coefficient. This statistical tool assisted in determining whether a student's performance in mathematics was significantly correlated with their growth mindset score. The software version 2.3.28 of Jamovi was used for all analyses.

To guarantee the safety, respect, and rights of every participant, this study closely adhered to ethical standards derived from the British Educational Research Association's (2018) guidelines. These ethical guidelines were followed by the researchers.

1. **Results**

**Table 1.** Descriptive Table

|  |  |  |  |
| --- | --- | --- | --- |
| **Independent Variable** | **Standard Deviation** | **Mean** | **Verbal Description** |
| Growth Mindset | 0.224 | 2.09 | High Growth Mindset |
| Mathematics Achievement | 5.68 | 85.8 | Very Satisfactory |

The levels of mathematical proficiency and growth mindset among Tambobong National High School students in Grade 7 are shown in Table 1. With a dispersion of 0.224 and 5.68 from the mean of 2.09 and 85.8, respectively, the standard deviation shows the variability of the growth mindset scores and math proficiency. The average mindset of Tambobong National High School's Grade 7 students is indicated by their mean score of 2.09. Furthermore, Tambobong National High School students in Grade 7 typically receive very satisfactory grades in mathematics, as indicated by their mean mathematics achievement of 85.8.

**Table 2. Test of Relationship**

|  |  |
| --- | --- |
| **Independent Variable** | **Academic Achievement** |
| **r-value** | **p-value** | **Decision on Ho** | **Interpretation** |
| Growth Mindset | 0.219 | 0.036 | Reject Ho | Significant |

An r-value of 0.219 and a p-value of 0.036 in Table 2 show a statistically significant positive correlation between growth mindset and mathematical achievement. This implies that students who have a greater growth mindset—the conviction that skills can be acquired via hard work and perseverance—perform better in math. Despite the moderate correlation, it is significant and suggests that encouraging students to adopt a growth mindset could help them achieve better academic results. The observed significant relationship rejects the null hypothesis, as the p-value falls below the 0.05 cutoff.

**Discussions**

 The mean responses of Grade 7 students to a standardized growth mindset questionnaire were employed to evaluate their growth mindset level in this descriptive-correlational study. The results yielded a mean score of 2.09, indicative of the interpretation "Growth Mindset with Some Fixed Ideas." This indicates that although the majority of students have faith in their capacity for enhancement, some maintain inflexible beliefs regarding particular skills, potentially obstructing their ability to surmount challenges (Dweck, 2006). Such conflicting mindsets are prevalent during early adolescence, a developmental phase characterized by evolving self-concepts. The growth mindset theory posits that intelligence and abilities can be cultivated through effort, strategic methodologies, and constructive feedback (Yeager & Dweck, 2012). This perspective is corroborated by Blackwell, Trzesniewski, and Dweck (2007), who discovered that students instructed on the malleability of intelligence exhibited enhanced motivation and superior academic performance, especially in mathematics.

 The students' final grades were obtained from their advisers and averaged to evaluate mathematics achievement. The analysis indicated that Grade 7 students at Tambobong National High School generally attained a “Very Satisfactory” level in mathematics, with an average grade of 85.8 and a standard deviation of 5.68. This performance level suggests that students are doing relatively well, although variations in mindset may affect their capacity to attain higher mastery. Jo Boaler (2013) asserted that success in mathematics is contingent upon mindset and learning strategies rather than inherent ability. Students who possess a belief in their capacity for improvement are inclined to engage more profoundly, persist for extended durations, and employ more efficacious problem-solving techniques.

 The correlation between growth mindset and mathematics achievement was examined using Pearson’s correlation coefficient, yielding r = 0.219 and p = 0.036. This signifies a positive and statistically significant correlation at the 0.05 level. The correlation, though modest, indicates that students possessing a robust growth mindset are likely to attain superior final grades in mathematics. This finding aligns with the research conducted by Claro, Paunesku, and Dweck (2016), which demonstrated that students possessing a robust growth mindset attained markedly superior academic results, despite socioeconomic challenges. The present findings corroborate the notion that mindset affects students' propensity to persevere, solicit assistance, and rebound from difficulties—behaviors that are particularly vital in mathematics education.

 Students possessing a growth mindset are more inclined to perceive failures as learning opportunities, whereas those with a fixed mindset may readily concede or eschew effort, perceiving it as indicative of insufficient ability. Dweck (2006) and Yeager and Dweck (2012) highlighted that these beliefs are significant predictors of academic resilience and performance. The current study does not establish a causal relationship; however, it underscores the importance of cultivating a growth mindset to enhance academic performance. Incorporating mindset development into classroom practices—via feedback-oriented instruction, resilience-enhancing activities, and the promotion of effort—can serve as a strategic intervention to enhance students' mathematical performance.

 This study possesses multiple limitations that must be acknowledged when analyzing the results. The employment of a purposive sampling method constrains the generalizability of the results, as participants were chosen from a singular public secondary institution—Tambobong National High School—within a defined geographical locale. The results may not accurately reflect students from private schools, various regions, or different grade levels. Secondly, mathematics achievement was assessed exclusively via students' overall average, which, although indicative of classroom performance, may be affected by discrepancies in teacher grading practices or assessment methods, rather than by standardized evaluations of mathematical proficiency. The cross-sectional design of the study limits the capacity to establish causal inferences between growth mindset and mathematics achievement; the observed relationship suggests correlation but does not verify a direct cause-and-effect link.

***Conclusion***

 This study emphasizes the significant relationship between mindset and mathematical achievement, indicating that cultivating a growth-oriented perspective may enhance student performance in the classroom. This quantitative correlational study aimed to examine the growth mindset levels of Grade 7 students and assess their relationship with mathematics performance. The analysis reveals that students attained an average growth mindset score of 2.09, classified as "growth mindset with some fixed beliefs." This suggests that although numerous students are confident in their capacity to advance through a growth mindset and effort, some continue to maintain fixed beliefs regarding intelligence.

 Recent research among junior high school students corroborates these findings. Dong, Jia, and Fei (2023) examined Grade 7 students in China and discovered that although a growth mindset did not directly forecast mathematics achievement, it significantly affected success indirectly via intrinsic motivation, failure attribution, and mathematics self-efficacy. Mangelsdorf et al. (2023) examined middle school students from socioeconomically disadvantaged backgrounds and found that those possessing a robust growth mindset exhibited superior academic performance and more effective adaptation during school transitions, underscoring its protective function. In a comprehensive longitudinal study conducted in California, Claro and Loeb (2024) discovered that students in Grades 4 to 7 who adopted a growth mindset achieved markedly greater learning gains in mathematics, corresponding to roughly 31 extra days of instruction annually.

***Recommendations***

 This study presents several recommendations to foster a growth mindset and improve mathematics achievement in junior high school students. Integrating growth mindset strategies into the curriculum is imperative. Educators ought to deliberately emphasize the value of effort, strategic learning, and perseverance over inherent ability, thereby fostering resilience and a more optimistic perspective toward mathematics in students. To reinforce these principles, schools are urged to implement mindset development activities, including workshops, guided reflection sessions, and storytelling exercises that illustrate instances of personal growth through perseverance and diligence.

Moreover, offering professional development for educators is essential. Educators must be equipped to identify fixed-mindset behaviors and employ evidence-based strategies that promote growth-oriented thinking in students. Providing teachers with these competencies will enhance the classroom environment and directly affect students' attitudes and performance. Parents and guardians are essential in fostering a growth mindset within the home environment. Educational institutions ought to provide orientation seminars or disseminate informative materials to families, advocating for the commendation of effort rather than outcomes and encouraging parental support for children in confronting challenges and deriving lessons from failures.

We recommend conducting additional research to delve deeper into the complex relationship between mindset and academic success. This study employed descriptive and correlational analyses; however, future research may include additional variables such as student motivation, metacognitive strategies, or instructional practices. Employing a mixed-methods or longitudinal design could yield a deeper comprehension of the development of a growth mindset and its interaction with various educational facets to influence learning outcomes.

**Ethical Approval:**

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

**Consent**

As per international standards or university standards, Participants’ written consent has been collected and preserved by the author(s).

**AI Usage Disclaimer:**

The author(s) hereby declare that generative AI technology (ChatGPT, GPT-4 by OpenAI), Quillbot, and Grammarly was used solely for idea generation and conceptual clarification during the early stages of manuscript development. The tool was used to explore research-related questions and organize thoughts, but no AI-generated text was copied or used in the manuscript itself. All writing, editing, analysis, and interpretation were conducted independently by the author(s).

Details of AI usage:

Tool used: ChatGPT (GPT-4, OpenAI)

Purpose: Clarification of theoretical concepts (e.g., growth mindset, correlational research, brainstorming of related literature and common limitations in descriptive studies, exploring how mindset theories relate to academic performance, identifying phrasing options for improving discussion coherence

Sample prompts used:

 "What is a good way to explain growth mindset theory in research?"

 "Why might students with a growth mindset perform better in math?"

 "What are common limitations of studies using purposive sampling?"

 "How can general averages be used to measure mathematics achievement?"

 "Give examples of how mindset affects motivation and academic performance."

 "What existing studies support the relationship between mindset and achievement?"

Tool used: QuillBot

Purpose: Language enhancement and paraphrasing of sentences.

Tool used: Grammarly

Purpose: Language enhancement and paraphrasing of sentences, plagiarism checker and AI checker.

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