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| RESEARCH ARTICLE

The Impact of Growth Mindset and Mathematics Anxiety on Students' Mathematics Achievement

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| ABSTRACT
This research aimed to assess the growth mindset, mathematics anxiety, and mathematics achievement of the Grade 7 students at a national high school in Mandaue City, Philippines. This study sought to determine the significant relationships among these variables as basis for an action plan. The descriptive-correlational method was used and adopted questionnaires were the primary data gathering tools. Results revealed that the level of growth mindset and mathematics anxiety experienced by the respondents is "high" which indicates that students are open to exploring new concepts that will help them maximize their potential; however, they still tend to feel anxious, i.e., taking college entrance exams, experiencing pop quizzes, and when receiving grades. The overall mean of students' mathematics achievement is 10.88 with a standard deviation of 3.80, which indicates that the respondents performed satisfactorily. The analysis of the relationship between the respondents' level of growth mindset and mathematics achievement had a very weak positive relationship, indicating that mathematics achievement isn't directly predicted by growth mindset. Conversely, the analysis of the relationship between the respondents' level of mathematics anxiety experienced and mathematics achievement manifests an inverse connection, which implies that the respondents' mathematics anxiety varies according to their mathematics performance. This suggests that exhibiting a high level of growth mindset, yet a high level of mathematics anxiety, still disrupts mathematics performance. The results emphasize the crucial role of lowering mathematics anxiety, which would enable motivation, resilience, and improved mathematics achievement. An action plan for improvement is hereby proposed.

| KEYWORDS

Descriptive-correlational research, growth mindset, mathematics achievement, mathematics anxiety, Philippines

| ARTICLE INFORMATION

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INTRODUCTION

Students consider math a difficult subject, in which this prejudice creates tension, worry, and low motivation which results in poor academic performance. When students express these unpleasant feelings, they manifest a fixed or poor growth mindset, and experience mathematics anxiety. Musa and Maat (2021) stated that students with low mathematical achievement had feelings of anxiety caused by their uncertainty and doubts regarding their mathematical abilities. Additionally, less motivated students have a poor mindset in learning math, experience anxiety, struggle with critical thinking skills, thus, resulting in low academic achievement (Aldrup et al., 2020).

Poor growth mindset and mathematics anxiety greatly contribute to low academic achievement. The Organization for Economic Cooperation and Development's (OECD) PISA (Program for International Student Assessment) 2022 highlights the repeating association that nations with children who express high levels of math anxiety also typically have worse math

performance. Out of 73 countries that were surveyed, children of 46 countries that have high levels of math anxiety while having high level of growth mindset performed well. This implies that, conversely, having high level of anxiety yet poor growth mindset results in poor academic performance. Filipino students manifested these poor factors as shown in Volume I and III, Filipino learners received a math score of 370, much below the OECD average of 489. Despite scoring two points more in mathematics in 2022 than in 2018 (from 353 to 355), the Philippines ranked 77th out of 81 participating countries, placing them among the weakest globally in this subject (Acido & Caballes, 2024). These results necessitate the call for learning initiatives of the Philippine educational system such as on math instruction, curriculum design, socio-economic factors, or teacher readiness. This also includes the exploration of the specific learning needs of the students such as assessing their level of growth mindset, mathematics anxiety, and achievement.

Additionally, compared to their Southeast Asian counterparts, Filipino students do noticeably worse in mathematics, according to the findings of the Southeast Asia Primary Learning Measures 2019 research. At the end of their primary years, over 41% of Filipino Grade 5 students did not attain the required level of proficiency in mathematics. They have limitations in understanding scales and measurement, and place value at most. Some may be able to recognize numbers or count a limited number of things, while others may only be able to add single-digit numbers together. These results show that Filipinos fall behind in terms of mathematics performance. However, some of these learners were promoted to the next level despite not having been able to fully master the skills. Latest report on students' promotion states that despite numerous reports of learning disruptions when schools switched to distant learning, the most recent data available indicates that, on average, almost all (99%) of students were promoted to the next level during the second year of the COVID-19 pandemic (SY 2021–2022). This is even slightly higher than the 95% promotion rate in SY 2019–2020 prior to the pandemic. This implies that while students are yet to grasp the required skills, due to the pandemic and drastic shift of learning modalities, they were promoted in which this would create successive learning needs as students are to learn new competencies on the next level, thus creating stress, anxiety, and poor growth mindset. This is obvious learning poverty and a call for school leaders, administrators, and especially math teachers to intensify their teaching strategies, and conduct learning innovations such as assessing students' growth mindset and mathematics anxiety, since these contribute to low mathematics performance.

According to the 2024 Philippine National Achievement Test (NAT) results for Grade 12 students, all areas and tracks scored "Low Proficiency" in core topics, especially in language and communication, physics, and mathematics. The national average score was 41.12% which is below the minimum score. Senior high school students feel anxious when attending math classes, thus making it hard for them to solve mathematical problems, which results in lower academic performance (Casinillo et al., 2022). When students tend to fail numerous times, they would attribute negative emotions which greatly impact their confidence and mindset on learning the subject. This is a reiteration of the call for educational reform and learning initiatives so that Filipino students will become numerate, mathematically proficient, critical problem solvers, and globally competitive.

Equivalent issues are also evident at some schools in the Division of Mandaue City, Philippines. For instance, as reported during the enrollment period for school year 2025-2026 in a national high school in Mandaue City, Philippines some incoming grade 7 students felt anxious and manifested low motivation and a poor growth mindset due to their curriculum transition from elementary to high school. Several students mentioned that they are not ready and feel anxious about all the subjects, and they can't contain their emotions of possibly failing some subjects, since they are not yet ready to become high school students. According to Deieso and Fraser (2018), one of the primary causes of mathematics anxiety is transitioning from a lower to a higher level of educational content. Moreover, local studies confirmed that the association between students' mindset and mathematical achievement is significantly influenced by mathematics anxiety (Peteros et al., 2025). Additionally, the latest first quarter results from the School Monitoring, Evaluation, and Adjustment (SMEA) report from this national high school show that grade 7 students ranked 3rd out of 4 grade levels in terms of mean percentage score (MPS) for written work with 78.04 and got a low MPS in periodical examinations with 66.21 which is below the standard. These results show that grade 7 learners lack the required fundamental knowledge in which this would indirectly influence intrinsic motivation, failure attributions, mathematics self-efficacy, and mathematics anxiety.

Results from Lurie et al. (2022), Porter et al. (2022), and Xia et al. (2022) show that growth mindset interventions positively impact the academic performance of the students. Moreover, Dong et al. (2023) stated that the association between growth mindset and mathematical achievement is influenced by failure attributions and mathematics anxiety, but then also mentioned that mathematical achievement is not determined directly by growth mindset. In contrast to current findings, the researcher has discovered an evidence gap from earlier studies. Evidence gaps are the kind of gap that addresses the drawbacks of previous studies. This dispute relates to research findings or claims that require evaluation or verification through evidence (Miles, 2017).

Considering these pressing problems, investigations into how growth mindset and mathematics anxiety affect incoming seventh-grade students' academic performance are essential. As the foundation for a suggested action plan, this study evaluates the growth mindset, math anxiety, and math achievement of Grade 7 students at a national high school in Mandaue City, Philippines for the academic year 2025–2026.

Theoretical Background

Three major theoretical frameworks provide the foundation for this study: Dweck's Mindset Theory (2006), Control-Value Theory of Achievement Emotions (Pekrun et al., 2002), and Attribution Theory (Weiner, 1985). Republic Act No. 10533 (Enhanced Basic Education K-12 Act of 2013), DepEd K-12 Mathematics Curriculum Framework (2016), DepEd Order No. 10, series of 2024 (also known as Policy Guidelines on the Implementation of the MATATAG Curriculum), Republic Act No. 11036 (Philippine Mental Health Act, 2018), and Republic Act No. 12080 (Basic Education Mental Health and Well-Being Promotion Act, 2023) are the five pertinent legal foundations upon which this study is based.

Everyone is born with an intense drive to learn. Students think, act, and feel differently from one another. Each of us has a different mindset. Mindset refers to a person's attitude or way of thinking, which influences how they interpret and react to situations. Dweck's Growth Mindset Theory (2006) has transformed educational psychology by challenging the traditional notion of intelligence as an innate, immutable trait. At its core, the theory posits that individuals who perceive intelligence as malleable, improvable through effort and learning, develop more adaptive responses to academic challenges.

In mathematics education, where performance anxiety and repeated failure experiences are prevalent, the implications of mindset are profound. It's been observed that students who embrace a growth mindset have a more optimistic outlook on mathematics. They tackle difficult questions with greater determination, and they're more driven to truly learn the subject (Bravo & Nobles, 2023). Plus, when teachers actively encourage a growth mindset in the classroom, students not only develop a stronger growth mindset but also see their grades improve, according to Porter et al. (2022). According to Xia et al. (2022), when junior high students participated in growth mindset classes, their enhanced beliefs in their potential led to notable academic improvements. Zhang et al. (2023) long-term research indicates that having a growth mindset doesn't automatically mean someone will ace math. Instead, it really influences other key things, like how interested a student is in math, how confident they feel about it, and how they handle mistakes. So, encouraging a growth mindset is like starting a chain reaction of positive feelings and motivation that can lead to better grades. But it's not the whole story. Barger et al. (2022) research points out that some students might have a "false" growth mindset. They might say they believe in working hard and getting better, but when things get tough, they still get super anxious and try to avoid the problem. These insights suggest that we need to link mindset more closely with self-management and emotional skills, rather than treating it as the only key to achievement.

Students with high growth mindset view challenges as opportunities, conversely, students who tend to manifest poor or fixed mindset struggle and are prone to negative emotions such as anxiety and despair. A lower growth mindset was associated with worse academic performance (Lurie et al., 2022). While the idea of a growth mindset focuses on what we believe about intelligence and hard work, another theory called the Control-Value Theory (CVT) helps us understand the feelings that go along with schoolwork, especially math anxiety (Pekrun et al., 2006). CVT says that our emotions in school come from two main things: how much we feel in control of what we're learning and how much we care about doing well or not. When students feel like they can't handle the work (like thinking "I'm just not good at math") but also feel like it's super important to do well ("Math is key to my future"), they're more likely to feel things like anxiety, shame, or like they just can't win. Anxiety is what you feel when you're nervous, worried, or just generally uneasy about something because you don't know what's going to happen. According to Barlow (2025), anxiety is a future-oriented mood state in which one is ready or prepared to attempt to cope with upcoming negative events. Mathematics anxiety negatively affects an individual's physiological and cognitive functioning, which results in the individual obtaining lower achievement in mathematics (Brewster & Miller, 2020). According to Milovanović (2020), a significant variable that contributes to lower math performance is anxiety. Mathematics anxiety is a barrier to mathematical learning and is thought to hinder students' engagement and the efficiency of their metacognitive processes (Gabriel et al., 2020). Furthermore, a reciprocal dynamic appears to exist in that poor math performance can reinforce anxiety, creating a self-perpetuating loop (Du et al., 2021). Longitudinal models suggest that early experiences of failure can calcify into beliefs about incompetence, further eroding control appraisals and amplifying emotional distress. Hence, mathematics anxiety is not merely a symptom of low ability; it is an active mechanism undermining achievement.

When individuals experience a result (such as success or failure), they try to justify why it happened. It has attribution patterns and applications to motivations, for instance in math, if a student failed in a math test, then, the student would attribute: "I didn't study enough" or "I'm just not good in math" by then, the student would think to study harder next time or lose motivation and avoidance. This is according to Weiner's Attribution Theory (1985), which is a fundamental psychological framework that explains how people understand experiences, especially success and failure, and how these interpretations affect their motivation, emotions, and behavior in the future. This theory is significant when gauging the growth mindset and level of anxiety experienced by the students, where the teacher's encouragement to try and innovate strategies is crucial.

When you put together the ideas of a growth mindset, how we explain our successes and failures (Attribution Theory), and how much control we feel we have (Control-Value Theory), you get a much clearer understanding of what helps children do well in math. If students know they have good qualities and believe they can improve, they're more likely to see effort as the key to success, instead of just thinking it's about luck or being naturally good at math. This attributional style enhances perceived control, which, per CVT, reduces anxiety. Thus, growth mindset and positive attribution indirectly affect performance via motivational (self-efficacy, intrinsic value) and emotional (anxiety) mediators.

Zhang et al. (2023) provided empirical evidence for this complex interaction through a structural equation model with Chinese junior high school students. The study revealed three significant indirect pathways from growth mindset to achievement: (1) via intrinsic motivation, (2) failure attribution and self-efficacy, and (3) failure attribution and mathematics anxiety. Similarly, Du et al. (2021) reported bidirectional relationships between mathematics anxiety, self-efficacy, and achievement among 2,789 Chinese primary school students, suggesting feedback loops that can either reinforce progress or stagnation. These findings are echoed in the Philippine context by Bravo and Nobles (2023), who found that Grade 11 students' growth mindset correlated positively with mathematics performance, mediated by self-efficacy, intrinsic value, and self-regulation, even under pandemic-related stressors. Test anxiety, a related construct, showed a weak negative correlation, further reinforcing the protective role of motivation-oriented mindsets.

Concrete evidence for the theoretical claims covered above can be found in the Philippine educational policy. Critical thinking, resilience, and learning-to-learn competencies are examples of 21st-century skills that must be included in the national curriculum, according to the Enhanced Basic Education Act of 2013, also known as Republic Act No. 10533. Likewise, parallel to the DepEd Mathematics Curriculum Framework of 2016, which places a strong emphasis on helping students in enhancing their critical thinking and problem-solving abilities. In order to improve student engagement and comprehension, this framework also emphasizes the importance of using pertinent resources, effective pedagogical tactics, and making linkages to real-world applications. Moreover, the Department of Education's most recent order, DepEd Order No. 10 series of 2024, which guides the implementation of the MATATAG Curriculum, places a special emphasis on students' socio-emotional development. In the teaching of mathematics, the policy supports methods that increase motivation, self-efficacy, and affective support. It provides a legal framework for the conceptual model of this study since it strongly supports the need to address affective barriers, such as fear, and encourages mindset-based methods for learning. These skills and approaches are intimately linked to the development of emotional regulation abilities and a growth mindset, both of which are essential for overcoming math anxiety.

Emotional, social, and psychological well-being of students plays a crucial role in their academic performance. Thus, it is a must to address concerns such as anxiety and poor growth mindset through mental health related initiatives. The Philippine Mental Health Act of 2018, also known as Republic Act No. 11036, aims to protect the rights of people with mental health conditions, ensure access to culturally appropriate and reasonably priced mental health care, integrate mental health services at all levels of the healthcare system, and increase public awareness of mental health issues. This Republic Act supports the research endeavor since, as stated, educational institutions and vocational schools must offer mental health education that emphasizes emotional stability, mental well-being, and early identification of problems, and counseling services and referral networks must be available to students. The Basic Education Mental Health and Well-Being Promotion Act (2023), also known as Republic Act 12080, is in line with this act. Its goal is to improve and regulate mental health and wellness support for learners, teachers, and other personnel in all public and private basic education institutions in the Philippines. These legal initiatives would holistically improve the well-being of the learners.

The literature affirms that mathematics achievement is a multifactorial construct shaped by cognitive ability, motivation, emotion, and beliefs. This is affirmed by the study of Carreon et al. (2021), that the performance of students is affected by factors causing math anxiety: environmental, individual, and behavioral factors. Growth mindset, when properly cultivated, promotes positive learning behaviors and reduces the maladaptive attributions associated with anxiety (Yeager & Dweck, 2020). To improve students' understanding of new concepts, a growth mindset must be exhibited by them (Perez et al., 2023). However, its effect is often indirect, mediated through variables like self-efficacy and intrinsic motivation (Zhang et al., 2023). In contrast, mathematics anxiety directly and negatively influences performance, but is itself shaped by underlying beliefs and emotional regulation (Du et al., 2021).

Collectively, these studies call for a holistic pedagogical approach that integrates mindset-building, emotional regulation, and motivational support. A purely cognitive emphasis on math proficiency is insufficient without addressing the affective terrain students navigate daily.

OBJECTIVES OF THE STUDY

This research assessed the growth mindset, mathematics anxiety, and mathematics achievement of the Grade 7 students at a national high school in Mandaue City, Philippines for the school year 2025-2026 as the basis for an action plan.
Specifically, this study sought to answer the following queries:

1. What is the level of growth mindset of the respondents?
2. What is the level of mathematics anxiety experienced by the respondents?
3. What is the level of mathematics achievement of the respondents?
4. Is there a significant relationship between the
   4.1 respondents' growth mindset and their mathematics achievement,
   4.2 respondents' mathematics anxiety and their mathematics achievement?
5. Based on the findings, what action plan may be proposed?

Statement of the Null Hypothesis

Based on the objectives of the study, the following null hypothesis were tested at a 0.05 level of significance:

Ho1: There is no significant relationship between the respondents' growth mindset and their mathematics achievement.

Ho2: There is no significant relationship between the respondents' mathematics anxiety and their mathematics achievement.

METHODOLOGY

Research Design

This research utilized a descriptive correlational design, which aimed to describe and determine the relationship between the students' growth mindset, students' anxiety, and mathematics achievement. The design is preferred because it ensures a complete description of the data collected rather than judging or interpreting the relationship between the two variables.

A descriptive correlational design is not associated with a single proponent. It evolved as quantitative research methods in disciplines like education, sociology, and psychology advanced. Descriptive correlation research design, as mentioned by Aprecia et al. (2022), describes the variables and measures the extent of the relationship that occurs between and among the variables. This method helped the researcher determine if the variables were significant: students' growth mindset, math anxiety, and mathematics achievement. This study followed a structured flow that began with the identification of the key variables (inputs), continued through a series of research procedures (processes) and culminated in the formulation of an actionable outcome (output).

The inputs of the study include the level of growth mindset, level of math anxiety, level of respondents' mathematics achievement, and the significant relationship among these variables. The level of growth mindset refers to how strongly students believe that their mathematical ability can improve through effort, strategy, and persistence. The level of math anxiety pertains to the emotional responses, such as fear or nervousness, that students experience when engaging with mathematics. Mathematics achievement was measured through students' academic performance in the achievement test. The study also seeks to determine the statistical significance of the relationships among these three variables to understand how mindset and anxiety relate to performance in mathematics.

The study started by getting permission from the school to do the research and collect data. A letter was sent explaining the purpose of the study. The researcher used a descriptive-correlational approach, which means that we observed the different things we were interested in (like growth mindset and math anxiety) as they were, without trying to change anything. This helped the researcher see how these things might be related. Next, the data was collected by having students fill out questionnaires about their growth mindset and how anxious they feel about math. The responses were gathered, including the students' math achievement scores. Then, statistical methods were utilized to see if there were any connections between these things. After that, the statistical results were analyzed to figure out what they meant and answer the research questions. Finally, conclusions and suggestions were curated based on the findings, aiming to help students have a better learning experience and address any problems identified.

This study resulted in a complete action plan specifically created to boost students' math skills. This plan focused on developing strategies to enhance students' growth mindset and reduce math anxiety, based on the insights gathered from the data. The action plan aims to serve as a practical response to the issues revealed in the study and a guide for educators, administrators, and guidance personnel in supporting student achievement in mathematics.

Environment

This study was conducted in the Division of Mandaue City, Philippines particularly in a national high school in West II District, where the researcher is currently teaching. The school has seven hundred seventy-three (773) students with twenty-eight (28) teachers. Due to its large student body, the school is regarded as one of the larger schools in the Mandaue City Division. However, the school is merely a three-story structure with ten (10) classrooms and four (4) shop rooms: the Home Economics (HE) Room, the Garments Room, the School Learning Resource Center, and the E-classroom. To address a shortage of classrooms, the school has also implemented morning and afternoon double shifts. While Grades 8 and 10 have been assigned for the afternoon shift, Grades 7 and 9 are scheduled for the morning shift. Because there aren't enough classrooms for senior high school students, this national high school located in Mandaue City, Philippines only serves junior high school students at the moment. Notwithstanding this drawback, the school has continuously won awards for excellence in a range of fields, demonstrating its dedication to high-quality instruction. The awards demonstrate how committed the faculty and students are to pursuing both academic and extracurricular success.

Respondents

The respondents of this study were Grade 7 students from a national high school in Mandaue City, Philippines. They were specifically chosen because, as first-year high school students, they are in a crucial stage of adjustment and identity formation,

which can significantly impact their academic performance. This transitional phase often influences their attitudes and emotional responses toward learning, especially in challenging subjects like Mathematics. The researcher believes that examining the growth mindset and math anxiety within this group would provide valuable insights into factors affecting their performance.

A complete enumeration technique was employed for the participants, ensuring that the entire grade 7 population was included in the study. Table 1 provides a summary of the research's respondents.

Table 1. Distribution of the Respondents

Section	N	%
7 - INDUSTRIOUS	29	16.48
7 - WONDERFUL	36	20.45
7 - EAGER	36	20.45
7 - ACTIVE	37	21.02
7 - RESPECTFUL	38	21.60
Total	176	100.00

Instrument

To measure all of the variables, the study employed a three-part survey questionnaire.

Part I. To determine how the students feel about their learning ability, particularly in mathematics, this section of the study used a questionnaire based on Chen et al. (2023) (refer to appendix B part I) with reliability of 0.911 and confirmatory factor analysis (CFA) of 0.3967 to 0.6416 for average variance extracted (AVE). If each item's AVE (Average Variance Extracted) is more than 0.50, the measurement model is considered to exhibit convergent validity. Students' perception that they can get wiser and develop their talents by working hard and persevering can be accurately measured using this assessment. It contains a number of assertions about having a growth mindset, including whether or not they think intellect can change, how much work is necessary, and how they handle difficulties or setbacks. On a scale of 1 (strongly disagree) to 5 (strongly agree), students stated how much they agreed with each statement.

Part II. The researcher employed a questionnaire based on Alexander & Martray's (1989) study to find out how math anxiety impacts students (refer to appendix B part II) with Cronbach's alpha ≈ 0.90 for its original version and 0.95 and 0.89 for some of its modified versions. Students are questioned about a variety of math-related topics in this survey, such as problem-solving, exams, and class participation. Students were given a scale ranging from 1 (strongly disagree) to 5 (strongly agree) to indicate how nervous or uneasy they felt in each scenario.

Part III. A 20-item test was given to the students to gauge their proficiency in math (refer to appendix D). The purpose of this geometry-focused test was to assess the students' comprehension and application of the material covered in their seventh-grade math classes. The test items, along with the Table of Specifications (TOS) were adopted from the Division of Mandaue City's Learning Resources Management and Development System (LRMDS) which were carefully constructed based on the following competencies: (1) drawing and describing regular and irregular polygons with 5, 6, 8, or 10 sides using measurements of sides and angles with a ruler and protractor; (2) constructing triangles, quadrilaterals, and regular polygons with specified angle measures; (3) identifying and explaining the relationships between angle pairs based on their measures; (4) classifying polygons according to the number of sides, their regularity or irregularity, and whether they are convex or non-convex; (5) analyzing the relationship between an exterior angle and its adjacent interior angle in a polygon; and (6) calculating angle measures and determining the number of sides in various polygons. The test aimed to gauge not only the students' procedural skills but also their conceptual understanding of geometric relationships and properties.

Gathering Procedure

There are three parts in the implementation of this study which include the preliminary, data gathering, and post data gathering stages. This is vital to have a systematic way of conducting the research. The careful planning and implementation of the study could lead to more reliable and ethically motivated results.

Preliminary Stage. The researcher's initial phase was to obtain approval from the schools' division superintendent (refer to appendix A). A written letter was sent requesting permission to conduct the study and to ask permission to utilize the 20-item achievement test along with the table of specifications (TOS). As soon as it was approved, orientation about the study was given to the parents and student-respondents. The researcher ensured that the parents or legal guardians of the respondents approved the informed consent forms, and respondents approved the assent form. The participants were made aware that their identities would remain anonymous and that their participation would be entirely voluntary, private, and confidential. Participants were also told that the information collected would be kept completely confidential and used solely for academic purposes. Additionally, e-mails requesting to utilize the tools were sent to the authors to ensure ethical use. The researcher observed all approved research protocols for conducting this study.

During Data Gathering Stage. Ensuring the respondents understood the purpose of the study, orientation was given on how they would answer the questionnaires. The respondents answered the growth mindset survey, the mathematics anxiety rating scale, and took the 20-item test to assess their mathematics achievement. Participants were given ample time to complete the test.

Post Data Gathering Stage. After the data was collected, the researcher sorted, summarized, and tabulated the results. The statistician received the data for treatment and analysis. The data was evaluated and interpreted, and the researcher was able to determine the level of growth mindset, mathematics anxiety, mathematics achievement of the respondents as well as the relationship between the mathematics achievement and mathematics anxiety, the relationship between mathematics achievement and growth mindset, and then created the action plan.

Statistical Treatment

To analyze the impact of growth mindset and math anxiety on students' performance in Mathematics, the following statistical tools were utilized:

Frequency Count. This tool was used to show how many students agreed, disagreed, or remained neutral on each statement related to growth mindset and math anxiety. This allowed it to be less difficult to ascertain the general opinions and sentiments of the students. Additionally, depending on their total scores, the responses were sorted and numbered to determine the proportion of the respondents that fit into the various growth mindset and math anxiety categories (such as Low, Medium, or High).

Percentage. This was utilized to determine how many respondents in the growth mindset and math anxiety questionnaires agreed, disagreed, or had no strong opinion about each statement. Based on their growth mindset and math anxiety ratings, the respondents were divided into three levels: low, moderate, and high. To illustrate the distribution of learners across various psychological profiles, the percentage of students was computed at each level. Additionally, the math performance of the student was categorized into levels, and the proportion of students in each level was displayed using percentages.

Aggregate Weighted Mean. This tool was employed to gauge the respondents' levels of math anxiety and their overall growth mindset. The levels of both mentality and anxiety were determined whether students generally displayed high, moderate, or low by averaging their survey responses. The relationship between these emotions and their mathematical performance was then investigated using this information.

Aggregate Standard Deviation. This instrument was used to gauge the degree of variance among the students' answers to the questions concerning their development mindset and math anxiety. This made navigating the group's diversity of emotions and viewpoints easier.

Pearson's r. The relevance of the association between math anxiety and math performance as well as the relationship between growth mindset and math performance have been examined using this tool. This made it feasible for the researcher to ascertain whether the variables had a substantial linear relationship. In order to address the study's main objective of identifying prospective characteristics that could predict students' ability in mathematics, this stage was essential.

Ethical Considerations

The participants were informed that their participation would be completely voluntary, private, and confidential, and that their identities would remain anonymous. Participants were further assured that the information collected would be kept completely confidential and utilized solely for academic purposes. Additionally, emails seeking to utilize the tools were sent to the authors to ensure ethical use. The researcher observed all approved research protocols for conducting this study to make this research suitable for publishing in a scientific journal.

RESULTS AND DISCUSSION

Growth Mindset of the Respondents

The respondents' degree of growth mindset is shown in this section. The students' growth mindset was rated on a five-point Likert scale, where 1 denoted the strongest disagreement and 5 the strongest agreement. The growth mindset range was computed using the aggregate of the mean and standard deviation. This part assesses the respondents' openness to examining novel ideas and concepts as well as their growth-oriented mentality. The respondents' traits and their views on their intellectual capacity are crucial for the research to attain the intended results.

Table 2. Level of growth mindset of the respondents (N = 176)

S/N	Indicators	WM	SD	Verbal Description
1	Learning aims to acquire more knowledge, broaden your horizons, satisfy curiosity and improve your ability.	4.46	0.67	Very High
2	If I succeed, it is mainly the consequence of hard work, potential talents, interests, and pursuits, and I will continue to pursue higher goals.	4.40	0.66	Very High
3	No matter how smart I am, I can improve my IQ by studying hard and making myself smarter.	4.00	0.83	High
4	IQ and talents can be improved by studying hard.	4.19	0.80	High
5	As long as I study hard and keep trying, I could improve my IQ and make myself smarter.	4.15	0.78	High
6	I'd like to constantly accept challenges to improve myself.	3.70	0.98	High
7	I am very curious and I like to try new things, dare to accept new things, and I will start again even if I failed once.	3.93	0.96	High
8	I am willing to challenge all the difficulties. I am not afraid of failure. I don't care about the opinions of others. I will persevere in finding new methods to solve the problem.	3.84	0.95	High
9	Faced with difficulties, I believe that I will be able to work industriously to cope with all the issues and overcome them.	4.05	0.85	High
10	As long as I persevere and pay an effort, and try all kinds of techniques, my goals will be achieved.	4.25	0.81	Very High
11	Hard work could bring positive results and unexpected gains.	4.37	0.77	Very High
12	If someone criticizes me, I will seriously analyze the underlying reason and reflect on my faults.	3.57	1.11	High
13	I am willing to accept suggestions from others, and I will learn a lot from them.	4.13	0.89	High
14	When my partner succeeds, I will think about and analyze the conditions and reasons for his success and learn from them actively.	3.99	0.84	High
15	If my partner wins something, I will have a sense of threat, and I may feel a little bit unhappy and jealous.	3.03	1.31	Moderate
16	Other peoples' criticisms are worthless, I disagree with them and am willing to listen to their ideas.	3.49	0.98	High
17	Talents often create success without pay efforts.	2.67	1.22	Moderate
18	I don't like challenges. It is difficult for me to exceed my current status. My IQ will never change.	2.51	1.10	Low
	Aggregate Weighted Mean	**3.82**	**High**	
	Aggregate Standard Deviation		**0.92**	

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

Table 2 shows that the respondents' level of growth mindset is generally high, with an aggregate weighted mean of 3.82 and an aggregated standard deviation of 0.92. Among the indicators, indicator number 18, which states "I don't like challenges. It is difficult for me to exceed my current status. My IQ will never change.", got the lowest weighted mean score of 2.51, with a relatively high standard deviation of 1.10, which indicates that the responses are varied amongst the respondents. According to Wijaya et al. (2025), students who believe their abilities are fixed and unchangeable are less engaged in their educational experience and are more likely to withdraw from challenging tasks. This entails that teachers should incorporate activities in the classroom that foster critical thinking and problem-solving skills to assist students directly interact with challenges and effectively foster a growth mindset. Additionally, rather than merely praising students for having the correct answers, teachers can also commend them for their persistence and strategic approaches. Students who receive such recognition are more likely to recognize the importance of their educational path and realize that mistakes are a necessary component of both academic and personal development. Furthermore, the next indicator that got a low weighted mean is indicator number 17 which states "Talents often create success without paying efforts." with a weighted mean of 2.67 and a high standard deviation of 1.22, which also indicates inconsistency of responses amongst the respondents. This implies that students regard success as being present with just only

talent and not with effort. According to Wetzler et al. (2024), the relationship between effort and academic achievement is moderated by mindset. Thus, students who think that by means of only talent, rather than effort, in doing tasks tend to perform poorly. These results necessitate teachers to eradicate this misconception by instilling positive mindset to students. Lastly, the indicator that got the third lowest weighted mean score is indicator number 15 which states that "If my partner wins something, I will have a sense of threat, and I may feel a little bit unhappy and jealous.", with a weighted mean score of 3.03 and a high standard deviation of 1.31. This implies that students tend to exhibit academic jealousy towards their peers. Malicious academic jealousy impairs an individual's positive conduct toward peers (Song, 2024). These results call for learning initiatives that promote healthy competition in the classrooms.

Generally, though results show that students have a high level of growth mindset, some of them still express negative mindset leading to negative emotions causing anxiety, jealousy, and fixed mindset. This necessitates the call for learning innovations to achieve high level of growth mindset. A high level of growth mindset is significant in learning mathematics as it promotes motivation and eliminates prejudice towards the subject. It enables the students to perceive potential barriers and cope with them. Growth mindset promotes problem-focused coping (e.g., planning, determined commitment) and positive reappraisal of setbacks by modifying primary appraisal by perceiving difficulties as opportunities and enhancing secondary appraisal through increasing grit and academic self-efficacy (Meng et al., 2025). Therefore, to eradicate negative or poor growth mindset amongst students, mathematics teachers should tailor, differentiate, innovate or design activities that promote in aiming not only to boost mathematics achievement but also to elevate growth mindset of students.

Mathematics Anxiety Experienced by the Respondents

This section presents the level of the respondents' mathematics anxiety experienced or their unpleasant feelings of stress, anxiety, or worry in learning mathematics.

Table 3. Level of mathematics anxiety experienced by the respondents (N = 176)

S/N	Indicators	WM	SD	Verbal Description
1	Studying for a math test.	3.46	1.11	High
2	Taking math section of the college entrance exam.	4.27	0.93	Very High
3	Taking an exam (quiz) in a math subject.	3.35	1.20	Moderate
4	Taking an exam (final) in a math subject.	3.94	1.19	High
5	Picking up math textbook to begin working on a homework assignment.	2.72	1.19	Moderate
6	Being given homework assignments of many difficult problems that are due the next class meeting.	3.88	1.10	High
7	Thinking about an upcoming math test 1 week before.	3.42	1.28	High
8	Thinking about an upcoming math test 1 day before.	3.72	1.11	High
9	Thinking about an upcoming math test 1 hour before.	3.99	1.16	High
10	Realizing you have to take a certain number of math classes to fulfill requirements.	3.80	0.95	High
11	Picking up math textbook to begin a difficult reading assignment.	3.30	1.18	Moderate
12	Receiving your final math grade.	4.12	1.10	High
13	Opening a math or stat book and seeing a page full of problems.	3.77	1.09	High
14	Getting ready to study for a math test.	3.16	1.24	Moderate
15	Being given a "pop" quiz in a math class.	4.18	1.03	High
16	Reading a cash register receipt after your purchase.	2.39	1.26	Low
17	Being given a set of numerical problems involving addition to solve on paper.	3.12	1.42	Moderate
18	Being given a set of subtraction problems to solve.	2.86	1.40	Moderate
19	Being given a set of multiplication problems to solve.	3.24	1.31	Moderate
20	Being given a set of division problems to solve.	3.61	1.20	High
21	Buying a math textbook.	2.45	1.22	Low
22	Watching a teacher work on an algebraic equation on the blackboard.	3.22	1.29	Moderate
23	Enrolling for a math class.	3.57	1.22	High
24	Listening to another student explain a math formula.	3.15	1.40	Moderate
25	Walking into a math class.	3.41	1.31	High
	Aggregate Weighted Mean	**3.44**		**High**
	Aggregate Standard Deviation		**1.20**	

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

Table 3 shows the respondents' level of mathematics anxiety experienced. With an aggregate weighted mean of 3.44 and a standard deviation of 1.20, the respondents demonstrated a high level of mathematics anxiety. Indicator number 2, which states "Taking math section of the college entrance exam." got the highest weighted mean of 4.27 with the lowest standard deviation of 0.93. This implies that the respondents are already stressing about taking the college entrance exams, specifically, the mathematics section of the exam, even if they are still in their seventh grade. According to Rabby et al. (2023), students from science backgrounds that are planning to take admission examinations had high symptoms of anxiety, depression, and stress compared to students from business studies. Therefore, the idea of taking admission tests greatly stresses students most especially in science and math subjects. This is followed by indicator number 15: "Being given a 'pop' quiz in a math class (WM = 4.18)," and indicator number 12: "Receiving your final math grade (WM = 4.12)," both with high levels of mathematics anxiety. These results mean that the respondents manifested anxiety when given tests without warning and are stressed about their mathematics grades. Students experiencing pop quizzes exhibited high level of anxiety (Mironenko, 2023). Likewise, their math achievement grades would also be affected due to the anxiety they experienced during quizzes. Mathematics anxiety impairs effective learning. It creates barriers to effective learning of mathematics since it diminishes the motivation, confidence, and engagement of students. Students' academic performance, confidence, and sustained appreciation for mathematics are all negatively affected by mathematics anxiety (Kadonsi, 2025). This suggests that immediate intervention should be done, if not eliminate, then alleviate the anxiety experienced by the respondents.

Mathematics Achievement of the Respondents

The respondents' level of mathematical achievement reflects their understanding of mathematical concepts as well as their ability to apply them in real life. Mastery of concepts and accuracy in problem-solving are prerequisites for high mathematics achievement. On the other hand, misinterpretations, incorrect calculations, or a failure to apply what was learnt, including the lack of a growth mindset and the existence of math anxiety, may be factors in the poor performance. The respondents' level of competency in mathematics provides helpful information for tailoring interventions and teaching strategies to improve learning.

Table 4. Level of mathematics achievement of the respondents (N = 176)

Level	Numerical Range	f	%
Outstanding	16-20	22	12.50
Very Satisfactory	12-15	55	31.25
Satisfactory	8-11	63	35.80
Fairly Satisfactory	4-7	34	19.32
Did Not Meet the Expectations	0-3	2	1.14
Total		**176**	**100.00**

Mean 10.88
St. Dev. 3.80

Table 4 presents the level of mathematics achievement of the respondents using frequency, percentage distribution, and numerical ranges. The overall mean is 10.88 with a standard deviation of 3.80, which indicates that majority of the respondents performed satisfactorily. Out of those who were assessed, 12.50% or 22 respondents achieved the "Outstanding" level. For "Very Satisfactory" or those who scored from 12 to 15 out of 20, there were 31.25% or 55 respondents. There were 63 respondents, or 35.80% who are under the "Satisfactory" level. Moreover, 19.32% or 34 respondents got scores from 4 to 7 or "Fairly Satisfactory" level. Unfortunately, 2 respondents, or 1.14% got scores from 0 to 3 or got the remark of "Did Not Meet the Expectations". Overall, the results are under the "Satisfactory" level; there might be some who achieved "Fairly Satisfactory" to "Outstanding" levels, but the frequency of the lower levels and "Did Not Meet the Expectations" suggests that there are factors affecting the low mathematics achievement of the students.

Significance of the Relationship between the Respondents' Growth Mindset and their Mathematics Achievement

Understanding the connection between growth mindset and mathematics achievement of the respondents can help educators design strategies that would gauge the effectiveness of growth mindset-integrated activities and improve achievement. Table 5 presents the test of the relationship between the respondents' growth mindset and their mathematics achievement.

The correlation coefficient (r-value) is 0.128, which implies that there is a very weak positive relationship between the respondents' level of growth mindset and their mathematics achievement. Likewise, the p-value is 0.091, which is greater than the

significance level of 0.05. This is in line with the results of Dong et al. (2023), which stated that mathematics achievement is not directly predicted by a growth mindset. Therefore, there is no significant relationship between the respondents' growth mindset and their mathematics achievement. This implies that there is the existence of false mindset. According to Barger et al. (2022), students may believe that they should work hard, yet, when things become more challenging, they tend to get anxious and avoid the problem which results in low positive motivation in learning mathematics.

Significance of the Relationship between the Respondents' Mathematics Anxiety and their Mathematics Achievement

The link between mathematics anxiety and mathematics achievement of the respondents is significant in understanding how tension, nervousness, or worry affects their mathematics performance, which also offers feedback to innovate ways to address this connection.

Table 5. Test of the significance of the relationship between the respondents' growth mindset and their mathematics achievement (N = 176)

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Growth Mindset and Mathematics Achievement	0.128	Negligible Positive	0.091	Do not reject Ho	Not Significant

**significant at p<0.05 (two-tailed)*

Table 6. Test of the significance of the relationship between the respondents' mathematics anxiety and their mathematics achievement (N = 176)

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Mathematics Anxiety and Mathematics Achievement	-0.172*	Negligible Negative	0.022	Reject Ho	Significant

**significant at p<0.05 (two-tailed)*

Table 6 shows the relationship between the respondents' math anxiety and math achievement. The correlation coefficient is -0.172, which indicates a negligible negative relationship. This implies that the respondents' math anxiety and math achievement exhibit a very weak inverse connection. Furthermore, the p-value of 0.022, which is less than the significance level of 0.05, denotes that there is a significant relationship between the respondents' math anxiety and their math achievement. However, though slight, the inverse connection denotes significance. Specifically, this indicates that when the respondents are more anxious, their mathematics achievement tends to decline, or when they perform better, they are less anxious. This is consistent with the results of Musa and Maat (2021), which stated that the lack of confidence and anxiety experienced when answering questions within a predetermined time frame are the main causes of the anxiety. Moreover, Pekrun et al. (2022) stated that students are more likely to experience feelings like anxiety, embarrassment, or the inability to succeed when they believe they can't handle the tasks. This implies that the respondents manifested anxiety, and it greatly impacted their mathematics achievement.

CONCLUSION AND RECOMMENDATIONS

The findings suggest that there is no clear correlation between a growth mindset and mathematical achievement yet shows correlation between mathematics anxiety and mathematics achievement. This implies that students manifested false growth mindset which indicates that they merely anticipate that they should put in a lot of effort, but when things grow harder, they often become nervous and ignore the problems, which lowers their motivation to learn mathematics – causing anxiety and resulting in poor mathematics performance. However, there might be factors exhibiting such false growth mindset and high level of math anxiety such as socio-economic status, physiological needs, teacher's competence, and misinterpretation of the goals and mandates of the Department of Education. Students who manifested high levels of growth mindset yet performed poorly during

the mathematics achievement test might belong to the marginalized sector. They might have supposedly performed well, however, due to additional responsibilities at home and the lack of parental support, they were anxious, and they lacked the opportunities to focus on their studies. Additionally, teacher competence might also be one of possible confounding factors since teachers might have lacked the navigation of effective pedagogies in teaching math and might have neglected students' anxiety and failed to elevate growth mindset which results in poor mathematics performance. Lastly, the incorrect interpretation of "no student should be left behind" mantra of the Department of Education or originally regarded as "A No Filipino Child Left Behind Act of 2008" by former senator Manny Villar which is regarded by some as the mass promotion of students who are yet to grasp the concepts and skills. This denotes the reiteration that instead of the incorrect interpretation, teachers should design and tailor activities according to the students' needs so that "no student will be left behind" which includes alleviating mathematics anxiety and elevating growth mindset.

Though revealing a slight correlation, growth mindset plays an important role in decreasing the mathematics anxiety experienced by the students. This implies that students might currently experience anxiety but, with the right activities, programs, and initiatives, anxiety would be alleviated, and false mindset would also be eradicated.

It is advised that an action plan be created for the upcoming quarters of the 2025–2026 academic year in accordance with the findings. Based on an analysis of students' math performance, growth mindset, and math anxiety, this method attempts to offer targeted learning activities to enhance domains. The action plan should enhance instruction, learning and ultimately enhance the well-being of learners. Specifically, the action plan should address the three lowest indicators and false growth mindset of students by implementing activities such as Self-Talk and Motivation, and Open-Ended Reflection Notes embedded during the learning engagements. Moreover, to address the high level of mathematics anxiety which significantly impacts students' mathematics achievement, the following activities are recommended: Utilizing Mood Meters during the motivation phase in the lesson plan and after the assessment, that would gauge students' emotions before and after the lesson, Incorporating gamification in teaching math, and game-based learning approach to boost students' interest, counseling and remedial sessions to students who struggle in learning mathematics, and the conduct of seminar to students and teachers on Mental Health such as Republic Act No. 11036 (Philippine Mental Health Act, 2018), and Republic Act No. 12080 (Basic Education Mental Health and Well-Being Promotion Act, 2023). The consistent monitoring and meticulous implementation of this action plan would ensure that the tailored initiatives are responsive to the needs of the learners.

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REFERENCES

[1] Acido, J. V., & Caballes, D. G. (2024). Assessing educational progress: A comparative analysis of PISA results (2018 vs. 2022) and HDI correlation in the Philippines. *World Journal of Advanced Research and Reviews, 21*(1), 462–474. https://doi.org/10.30574/wjarr.2024.21.1.0020

[2] Aldrup, K., Klusmann, U., & Lüdtke, O. (2020). Reciprocal associations between students' mathematics anxiety and achievement: Can teacher sensitivity make a difference? *Journal of Educational Psychology, 112*(4).
[3] https://doi.org/10.1037/edu0000398

[4] Alexander, L., & Martray, C. (1989). The development of an abbreviated version of the mathematics anxiety rating scale. *Measurement and Evaluation in Counseling And Development, 22*(3), 143-50.

[5] Aprecia, N. A., Barrera, G., Cuares, K. R., Cuison, M. J, Lazaro, M. K., Pat-I, K. K., & Sayson, Y. J., (2022). Descriptive correlation study on the physical environment and perceived academic performance of stem online learners, page 2. https://bit.ly/3IBWLh8

[6] Barger, M. M., Xiong, Y., & Ferster, A. E. (2022). Identifying false growth mindsets in adults and implications for mathematics motivation. *Contemporary Educational Psychology, 70*(102079), 102079. https://doi.org/10.1016/j.cedpsych.2022.102079

[7] Barlow, D. (2025). Anxiety and its disorders. Google Books. https://bit.ly/4lJbzti

[8] Bravo, G. A., & Nobles, B. (2023). Students' growth mindset, motivation, and mathematics performance: A correlational study. *Asia Pacific Higher Education Research Journal (APHERJ), 10*(1). https://bit.ly/4o1fh2U

[9] Brewster, B. J. M., & Miller, T. (2020). Missed Opportunity in mathematics anxiety. *International Electronic Journal of Mathematics Education, 15*(3), em0600. https://doi.org/10.29333/iejme/8405

[10] Carreon, M. L., Genara, M. A., & B Dumapit. (2021, December 10). Factors causing math anxiety on junior high students: A case of an upland academic community. https://bit.ly/3TN3mHZ

[11] Casinillo, L. F., Casinillo, E. L., Lagumbay, C. T., Rissah, H., & Dagongdong, M. L. (2022). Revisiting mathematical resilience and anxiety among senior high students. IJIET *International Journal of Indonesian Education and Teaching, 6*(2), 193–203. https://bit.ly/4nWQEUV

[12] Chen, S., Ding, Y., & Liu, X. (2023). Development of the growth mindset scale: Evidence of structural validity, measurement model, direct and indirect effects in Chinese samples. *Current Psychology, 42*(3), 1712-1726.

[13] Deieso, D., & Fraser, B. J. (2018). Learning environment, attitudes and anxiety across the transition from primary to secondary school mathematics. *Learning Environments Research, 22*(1), 133–152. https://doi.org/10.1007/s10984-018-9261-5

[14] Dong, L., Jia, X., & Fei, Y. (2023). How growth mindset influences mathematics achievements: A study of chinese middle school students. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1148754

[15] Du, C., Qin, K., Wang, Y., & Xin, T. (2021). Mathematics interest, anxiety, self-efficacy and achievement: Examining reciprocal relations. *Learning and Individual Differences, 91*(102060), 102060. https://doi.org/10.1016/j.lindif.2021.102060

[16] Gabriel, F., Buckley, S., & Barthakur, A. (2020). The impact of mathematics anxiety on self-regulated learning and mathematical literacy. *Australian Journal of Education, 64*(3), 227–242. https://doi.org/10.1177/0004944120947881

[17] Kadonsi, K. (2025). Developing mathematical resilience: Effective strategies to alleviate mathematics anxiety among secondary school students in Kalomo District, Zambia. *International Journal of Research and Innovation in Social Science*. https://bit.ly/3UBBsPq

[18] Lurie, L. A., Hangen, E. J., Rosen, M. L., Crosnoe, R., & McLaughlin, K. A. (2022). Reduced growth mindset as a mechanism linking childhood trauma with academic performance and internalizing psychopathology. *Child Abuse & Neglect*, 105672. https://doi.org/10.1016/j.chiabu.2022.105672

[19] Md. Reza-A Rabby, Md. Saiful Islam, Maisha Tahsin Orthy, Ahmad Tousif Jami, & M. Tasdik Hasan. (2023). Depression symptoms, anxiety, and stress among undergraduate entrance admission seeking students in Bangladesh: a cross-sectional study. *Frontiers in Public Health, 11*. https://doi.org/10.3389/fpubh.2023.1136557

[20] Meng, Y., Sun, Y., Yang, L., & Mydin, Y. O. (2025). Mechanisms from growth mindset to psychological well-being of Chinese primary school students: The serial mediating role of grit and academic self-efficacy. *Behavioral Sciences, 15*(5), 621–621. https://doi.org/10.3390/bs15050621

[21] Miles, D. A. (2017, August). ARTICLE: Research methods and strategies workshop: A taxonomy of research gaps: Identifying and Defining... *ResearchGate*; https://bit.ly/46p3hjN

[22] Milovanović, I. (2020). Math anxiety, math achievement and math motivation in high school students: Gender effects. *Croatian Journal of Education-Hrvatski Časopis Za Odgoj I Obrazovanje, 22*(1). https://doi.org/10.15516/cje.v22i1.3372

[23] Mironenko, O. (2023). Assessing the impact of weekly in-class pop quizzes on student performance in a fundamental ECE course. *American Society for Engineering Education*. *Asee.org*. https://bit.ly/3VDPhxH

[24] Musa, N. H., & Maat, S. M. (2021). Mathematics Anxiety: A case study of students' learning experiences through cognitive, environment and behaviour. *International Journal of Academic Research in Business and Social Sciences, 11*(3). https://doi.org/10.6007/ijarbss/v11-i3/8992

[25] Pekrun, R. (2006). The Control-Value Theory of Achievement Emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

[26] Pekrun, R., & Marsh, H. W. (2022). Research on situated motivation and emotion: Progress and open problems. *Learning and Instruction, 81*, 101664. https://doi.org/10.1016/j.learninstruc.2022.101664

[27] Peteros, E. D., Tandoc, L. B., Palapar, M. H., Adlaw, R. C., & Fuentes, C. M. (2025). Mathematics anxiety as a moderator between self-esteem and mathematics achievement among Filipino Grade 8 students. *STEM Education, 5*(5), 933–953. https://doi.org/10.3934/steme.2025041

[28] Porter, T., Catalán Molina, D., Cimpian, A., Roberts, S., Fredericks, A., Blackwell, L. S., & Trzesniewski, K. (2022). Growth-mindset intervention delivered by teachers boosts achievement in early adolescence. *Psychological Science, 33*(7), 095679762110611. https://doi.org/10.1177/09567976211061109

[29] R. Perez, MAEd, L., Zoriet G. Comia, Q., Benedict G. Calunod, J., A. Lakampuenga, L., Clark M. Medrozo, K., Daniel R. Repalda, Q., Carmela M. Parungo, M., & L. Remulla, J. (2023). Growth mindset practices and academic resilience of the junior high school students in Philippine school Doha, S.Y. 2022-2023. *International Journal of Research Publications, 123*(1). https://doi.org/10.47119/ijrp1001231420234743

[30] W J. Song. (2024). The Effect of academic jealousy on prosocial behavior in high school students. Globethesis.com. https://bit.ly/42vCb9e

[31] Wetzler, E. L., Farina, A. G., Kelly, D. R., Powers, J. J., & Matthews, M. D. (2024). Mindset about talent moderates the effect of grit on academic performance: Evidence from West Point Cadets. *Journal of Character and Leadership Development, 11*(2), 38–47. https://doi.org/10.58315/jcld.v11.295

[32] Wijaya, T. T., Li, X., & Cao, Y. (2025). Profiles of growth mindset and grit among rural Chinese students and their associations with math anxiety, motivation, and self-efficacy. *Scientific Reports, 15*(1). https://doi.org/10.1038/s41598-025-07400-z

[33] Xia, R., Zhang, P., Liu, R., Xue, J., Zhu, H., Guo, G., Zhang, M., & Liu, Y. (2022). The beneficial effect of growth mindset intervention for adolescents in economically disadvantaged areas of China. *Journal of Pacific Rim Psychology, 16*, 183449092211423. https://doi.org/10.1177/18344909221142368

[34] Yeager, D. S., & Dweck, C. S. (2020). What can be learned from growth mindset controversies? *American Psychologist, 75*(9), 1269–1284. https://doi.org/10.1037/amp0000794

[35] Zhang, S., Zhao, T., Liu, X., Wei, C., & Liu, S. (2023). Trait gratitude and subjective career success: the mediating roles of growth mindset and network breadth. *Career Development International, 28*(3), 300–313. https://doi.org/10.1108/cdi-07-2022-0188