



INVESTIGATING THE INTEREST AND MATHEMATICS ACHIEVEMENT OF GRADE 11 STUDENTS ENROLLED IN NON-STEM STRAND IN THE PHILIPPINE SETTING

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Abstract:

This research assessed the choice components of the Grade 11 students in forgoing the Science, Technology, Engineering, Mathematics (STEM) strand at a public high school in Mandaue City, Cebu, Philippines, using a descriptive correlational research design. There were 50 Grade 11 students who participated in the study and were identified using the complete enumeration technique due to their small population. The data gathered were treated with descriptive and inferential statistics. The results revealed that the respondents have a moderate interest in learning Mathematics, while most of them have satisfactory performance in Mathematics. Moreover, there was no association between the respondents' choice of strand and their mathematics achievement. Similarly, there was no significant correlation between the respondents' math interest and their mathematics achievement. However, there was a significant difference in the math interest of the respondents when grouped by the academic strand chosen. The results underscore the importance of recognizing and addressing diverse educational needs within different Senior High School (SHS) strands and emphasize the necessity for tailored strategies to cultivate math interest aligned with the chosen academic track.

Keywords: academic strand chosen, mathematics interest, mathematics achievement, grade 11 students

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1. Introduction

Education is essential for both individual and societal progress because education gives knowledge, critical thinking abilities, and essential skills that everyone needs to face life's obstacles (González-Salamanca, 2020; Shor, 2024). It develops communication, problem-solving, and critical thinking abilities that are vital in any undertaking. An educated person develops independence and self-confidence while skillfully navigating the complexity of today's environment. Education makes people more capable of contributing to the modern world by enabling them to face obstacles head-on with tenacity and resolve (Ulfah, 2023). Moreover, education is a key factor in deciding one's employability abroad in the context of global competitiveness. Employers are looking for people who have the skills needed to succeed in a global marketplace as the world grows more linked. People with higher levels of education and competence have a better chance of landing jobs in global corporations (Cheng *et al.*, 2023).

Due to the 10-year basic education program, which other nations considered inadequate, Filipinos previously had trouble getting respect for the professionals the nation created because they were not accepted in highly industrialized nations. According to Cerezo *et al.* (2023), one of just three countries globally and the last in Asia to offer a 10-year pre-university program was the Philippines. The Philippine Educational System implemented a more dynamic and modern curriculum that followed a 12-year timeline in order to better align the curriculum and meet the needs of the global market, where a quality education is now a must for everyone. Examples of K–12 initiatives aimed at giving students the foundational skills they need for both lifelong learning and the workforce. Filipino professionals and students studying overseas were able to acquire the essential skills and competencies needed to meet the demands of the international market (Abragan *et al.*, 2022). As a result, the two groups of people began to recognize one another. Since participants in this new program had to graduate at the age of 18, they produced learners who were ready for jobs, entrepreneurship, and middle-level skill development. However, some students avoid enrolling in the Science, Technology, Engineering, and Mathematics (STEM) strand since it has many math subjects. It has been observed that many students consider math a difficult subject.

This has been evident during the participation of the Philippines in Trends in International Results in Mathematics and Science Study (TIMSS), which showed that the country has consistently scored below the international average in both math and science. While there have been some improvements over the years, the overall rankings have still placed the Philippines behind many other countries. According to TIMSS 2019, out of 58 nations, the Philippines ranked worst in science and mathematics. It gave the Philippines scores of 297 and 249 in mathematics and science, respectively, the lowest among the 58 countries involved in the study (Shaeef *et al.*, 2024). It is crucial to instil in students a genuine interest in mathematics and help them appreciate its practical applications in real-life situations. Mathematics is not just a subject confined to classrooms; it is a

powerful tool that permeates every aspect of our lives, from personal finance to scientific discoveries and technological advancements (Peteros, 2024).

This issue has been prevalent in many regions across the country, particularly in one of the public schools in Mandaue City, Cebu, Philippines, wherein students have consistently poor performance in Math. With these, many students are choosing academic strands other than STEM primarily due to a perception that STEM subjects are challenging, particularly mathematics-related subjects. While it's essential to acknowledge that different students have diverse interests and strengths, the dislike of math-related subjects can be attributed to several factors, such as perception of difficulty, lack of confidence, and societal norms (Calingayan, 2025; Wen & Dube, 2022).

Although studies have explored factors influencing the choice of Senior High School (SHS) strands, there is a noticeable gap regarding the specific focus on not choosing the STEM strand. Most existing research in this area encompasses a broad range of factors, neglecting an in-depth examination of the role of math interest and math achievement, particularly within the context of the other strands where some students enroll. This research gap presents an opportunity to delve deeper into the interplay between students' math interest, math achievement, and their decision-making process regarding these specific strands, providing valuable insights for students, parents, educators, counselors, and policymakers to enhance career guidance and educational support for students. By acknowledging the crucial role math interest plays in shaping academic choices and achievement, we can work collectively to empower students to embrace mathematics and reach their full potential in their chosen academic paths.

2. Literature Review

This study is based on the Interest-Driven Creator Theory, which was developed by a group of Asian researchers who postulate that students are motivated by their interests and can produce greater ideas and subject-matter knowledge. According to this idea, the three anchoring concepts that make up a loop are interest, creativity, and habit. This only means that when learning becomes interesting for students, they will focus their attention on learning, spend time and energy, make effort without feeling that they are making effort, enjoy learning, and, consequently, excel in learning performance (Chan *et al.*, 2019). This only means that when learning becomes interesting for students, they will focus their attention on learning, spend time and energy, make effort without feeling that they are making effort, enjoy learning, and, consequently, excel in learning performance (Chan *et al.*, 2019).

Additionally, students will develop interest-driven habits if they repeat these procedures in their regular learning routines. As a habit trigger, the cuing environment tells the brain to get ready and switch to automatic mode so that a learning behavior can take place. Additionally, students experience harmony—positive emotions like contentment, happiness, achievement, and inner peace—by repeating such interest-driven creations in their everyday routines. Students will acquire 21st-century abilities,

establish a creative habit, and achieve academic success by incorporating this interest-driven creating process into their everyday learning routines.

Furthermore, Ronald Walberg's (1981) theory of productivity highlights the importance of attitudes and beliefs in affecting academic accomplishment, especially when it comes to appreciating mathematics. According to Walberg, a student's total performance and productivity are greatly influenced by how much they enjoy or dislike a particular topic, like mathematics. It suggests that cultivating a positive attitude towards the subject can contribute to increased engagement, motivation, and ultimately, better academic outcomes. When students have a favorable perception of mathematics, they are more likely to invest time and effort into learning, leading to improved proficiency.

In practical terms, educators can implement teaching strategies that not only focus on the content but also aim to foster a positive and enjoyable learning experience. This may involve incorporating real-world applications, interactive activities, and addressing any negative perceptions or anxieties related to mathematics. By comprehending and utilizing Walberg's theory of productivity in relation to students' enjoyment of mathematics, teachers may be able to alter students' attitudes, which could result in a more favorable learning environment and, ultimately, better academic achievement. In addition, John Holland argues in his Theory of Career Choice that a person's personality is expressed through their choice of profession and career adjustment. Along with their hobbies and values, people also express themselves through their professional choices and experiences. According to Holland (1997), social, environmental, and biological factors all have an impact on people's preferences for specific activities. People want an environment where they can use their skills and abilities while also expressing their values and attitudes. Along with their hobbies and values, people also express themselves through their professional choices and experiences.

People receive feedback from career assessments through a Holland Code, which highlights their top three interest domains. Counselors assist individuals in interpreting these results and guide them toward careers that align with their personality types. The main idea is that congruence between a worker's personality and their work environment greatly influences important outcomes like job satisfaction, job retention, and job performance (Sheldon & Holliday, 2019).

Historically, the Philippines was one of only three countries with a 10-year basic education cycle, along with Djibouti and Angola. Most countries follow a 12-year cycle (Official Gazette). To address this, the Philippines implemented the K-12 program, consisting of kindergarten, six years of primary education, four years of junior high school, and two years of senior high school. This change aims to better prepare students for tertiary education, employment, skills development, and entrepreneurship. The implementation of K-12 is seen as essential for national development despite facing several challenges during its rollout. Improving the quality of education is critical to ensuring the country's success (Abueva, 2023). President Aquino emphasized that Republic Act No. 10533 institutionalizes an education system designed to equip the youth

with the necessary skills to achieve their dreams, bringing Philippine education closer to global standards (Yee, 2022).

In Senior High School, students can choose from the Academic, Arts and Design, Sports, or Technical-Vocational Livelihood tracks. Within the Academic track, there are four strands: Accountancy, Business and Management (ABM); Science, Technology, Engineering, and Mathematics (STEM); Humanities and Social Sciences (HUMSS); and the General Academic Strand (GAS). Among these, STEM offers the most extensive mathematics coursework. The Department of Education (DepEd) issued DepEd Order No. 41, s. 2015 to assist students in making well-informed judgments regarding their SHS track and strand, which describes the Career Guidance Program (CGP) for Senior High School students. Students in Grade 10 benefit from this curriculum by learning about their interests, strengths, and desired careers (Education, 2019). Career decision-making is increasingly challenging due to rapid changes in the world of work (Gati & Landman-tal, 2020). Some students choose college courses unrelated to their SHS track, leading to academic struggles. Research suggests that a mismatch between high school experiences and college expectations contributes significantly to students losing interest in college (Quintos *et al.*, 2020).

Interest plays a vital role in motivation. Even before "motivation" became a formal psychological concept, interest was already recognized as crucial to learning. Bandura (1977) introduced the concept of triadic reciprocal causation, highlighting how personal, behavioral, and environmental factors interact in learning. This cognitive perspective suggests that individuals actively process environmental information, leading to different outcomes. Cherry (2023) further explains that reciprocal determinism—central to Bandura's social learning theory—describes how individuals' thoughts and emotions, their environment, and their behavior all influence each other. Longitudinal studies by Lazarides and Gaspard (2019) have shown that students' interest in mathematics tends to decline during adolescence.

Given these realities, the government must address issues within the K-12 curriculum. Key areas include providing more training and workshops for teachers, reducing excessive paperwork, ensuring that instruction remains teachers' core responsibility, improving assessment practices, and reviewing the curriculum for necessary legislative revisions (Abragan *et al.*, 2022). Scherrer *et al.* (2020) highlight the important relationship between academic interest and achievement in mathematics.

In the Philippine context, Dumapias and Tabuzo (2018) found that students' interest and confidence in Mathematics and Science were moderately high and significantly correlated with their interest in pursuing the STEM strand. Further research by Huang *et al.* (2019) showed that implicit theories of intelligence, mathematics self-efficacy, and math anxiety significantly influence students' career interests, with gender differences observed. For boys, arithmetic proficiency affected career interest and math anxiety, while for girls, math anxiety had a direct effect on career interests.

Mamolo and Labina (2025) found alarming results regarding students' general mathematics proficiency, suggesting that teachers should adopt more engaging and

varied teaching techniques to enhance learning. Similarly, Cardinas (2020) recommended that career guidance programs in public junior high schools be strengthened by training teachers and advisers to better support students in making informed career choices. Additionally, math anxiety negatively correlates with academic performance in the subject. Teachers are encouraged to create supportive learning environments to reduce students' anxiety and improve their math performance (Peteros *et al.*, 2022).

Building on established frameworks and existing literature provides a strong foundation for research design, data collection, analysis, and interpretation. Engaging with broader academic discourse strengthens the credibility and relevance of educational research. Although the concept of mathematical literacy can vary depending on context and individual interpretation, its importance is undeniable. Mathematical literacy emphasizes the need for learners to access, understand, and use mathematics effectively in everyday situations. Therefore, it is essential to update school curricula to provide students with rich, real-world mathematical experiences that will help them solve diverse problems and become truly mathematically literate citizens (Genc & Erbas, 2019).

3. Purpose of the Study

This research assessed the math interest and achievement of Grade 11 students enrolled in the non-STEM strand at a public high school in Mandaue City, Cebu, Philippines, for the school year 2023-2024. Specifically, it seeks to answer the following objectives:

- 1) To determine the level of math interest of the respondents in learning math,
- 2) To determine the level of mathematics achievement of the respondents,
- 3) To test the association between the academic strand chosen and the mathematics achievement of the respondents,
- 4) To test the relationship between the math interest and the mathematics achievement of the respondents,
- 5) To test the difference in the math interest among the respondents when grouped by their academic strand choice.

4. Materials and Methods

This section presents the research design, data gathering process, and how the data were handled to achieve the objectives of the study.

4.1 Research Design

This research utilized a quantitative research design which aimed to test the association of the academic strand chosen by the respondents and their mathematics achievement, math interest and mathematics achievement. Moreover, this study also tests if there is a significant difference in the math interest among the respondents when grouped by the academic strand chosen.

4.2 Respondents

The respondents of this study were the Grade 11 students who did not enroll in the STEM strand of a public high school in Mandaue City, Cebu, Philippines and are officially enrolled for the school year 2023-2024. A complete enumeration technique was utilized due to the small population of students who enroll in the Non-STEM strand. Table 1 presents the distribution of the profile of the respondents.

Table 1: Profile of the Respondents

Profile	f	%
Age		
>19	2	4.00
17-18	6	12.00
15-16	42	84.00
Total	50	100.00
Gender		
Female	29	58.00
Male	21	42.00
Total	50	100.00
Academic Strand Chosen		
Accountancy, Business, and Management (ABM)	6	12.00
General Academic Strand (GAS)	12	24.00
Humanities and Social Sciences (HUMMSS)	21	42.00
Technical-Vocational-Livelihood (TVL)	11	22.00
Total	50	100.00

It can be noted that most of the respondents are aged from 15 to 16 years old, indicating that the respondents are of their expected age at their grade level, while most of them were female students. Interestingly, most of them were enrolled in HUMMSS, which is followed by GAS. The data indicate the diversity of the respondents in this study.

4.3 Data Collection Tools

This research utilized a survey questionnaire entitled “Students' Interest Inventory (SII)” from Redinger (2017) with 10 statements, and respondents were asked to rate each statement using a five-point Likert Scale, namely: 5-Strongly Agree to 1-Strongly Disagree. For the gathering and collection of respondents' mathematics achievement, the researchers were to record students' raw scores in their 40-item Mathematics Achievement Test administered by the respective Math teachers.

4.4 Data Gathering Process

The researchers follow the protocol during the conduct of the study. A transmittal letter was sent to the Schools Division Superintendent requesting authorization for the research. Following approval, the researchers and the principal coordinated and determined the data collection timetable. The researchers individually presented an overview of the study objectives to the participants on the specified day. Students were

asked to offer informed consent before participating. Students were given ample time to complete the surveys and were given clear instructions on how to complete them correctly. The retrieval of questionnaires was closely monitored. Lastly, the data gathered was handled and kept properly in compliance with the Data Privacy Act.

4.5 Data Analysis

The data collected were sorted, tallied, treated and analyzed based on the study's objectives. Weighted Mean was used to determine the level of interest of the respondents, while the standard deviation was used to measure the spread of the respondents' assessments on the statements describing their math interest. Pearson Product-Moment Correlation Coefficient was utilized to test the relationship between the respondents' math interest and their math achievement. Chi-square test was utilized to test the significance of the association between the academic strand chosen and their mathematics achievement. Lastly, One-way ANOVA was utilized to test the significance of differences among the respondents' math interest when grouped by the academic strand chosen. Moreover, the following null hypotheses were tested based on the study's objectives:

H₀₁: There is no significant association between the academic strand chosen and the mathematics achievement of the respondents.

H₀₂: There is no significant relationship between the math interest and the mathematics achievement of the respondents.

H₀₃: There is no significant difference in the math interest among the respondents when grouped by their academic strand chosen

5. Results and Discussion

This section presents the level of respondents' interest in learning mathematics and mathematics achievement. It also presents the test of the hypotheses. The said attributes are presented in the tables.

5.1 Level of Interest of the Respondents towards Learning Mathematics

Interest refers to a feeling of wanting to know, learn, or be involved with something. This sense of interest often drives people to learn, inquire, and engage in activities that they find intriguing or enjoyable. Thus, the level of interest of the respondents was examined and is presented in Table 2.

Table 2 presents the level of interest of the respondents regarding learning mathematics. It included various indicators related to their attitudes and perceptions about math learning. The table provided the Weighted Mean (WM) for each indicator, indicating the average score given by respondents, and the Standard Deviation (SD), representing the variation or dispersion of the responses. Additionally, the table included a verbal description for each indicator, categorizing the level of interest.

Table 2: Level of Interest of the Respondents towards Learning Mathematics

S/N	Indicators	WM	SD	Verbal Description
1	I like learning math.	3.30	1.04	Moderate
2	I think that math will help me later in life.	3.78	0.97	High
3	Learning new things in math is fun for me.	3.14	1.11	Moderate
4	I see how math connects in my math class.	3.54	1.03	High
5	I am struggling in math.	3.38	1.07	Moderate
6	Math is something you just memorize.	3.00	0.86	Moderate
7	I solve real-world problems in my math class.	3.04	0.97	Moderate
8	High school mathematics has little to do with the real world.	3.30	0.89	Moderate
9	I am confident in my math skills.	2.70	0.93	Moderate
10	I enjoy my time in math class.	3.10	0.99	Moderate
Aggregate Weighted Mean		3.23		Moderate
Aggregate Standard Deviation			0.99	
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				

The aggregate weighted mean for all indicators was 3.23, indicating a moderate level of interest in learning mathematics among the respondents. The standard deviation of 0.99 suggested a moderate degree of variability in the responses, indicating some diversity in individual attitudes toward different aspects of math learning.

This table provided valuable insights into the students' perceptions about learning mathematics, helping educators and researchers understand the areas where students show more interest and those where improvement might be needed to enhance their engagement with the subject. Moreover, the questions in the table focused on understanding the respondents' attitudes, beliefs, and experiences related to learning mathematics. The indicators covered various aspects such as liking math, perceiving its relevance to real life, finding it enjoyable or challenging, and expressing confidence in math skills.

5.2 Mathematical Achievement of the Respondents

Understanding a student's level of mathematics achievement holds profound significance in the realm of education and beyond. It serves as a compass, guiding educators, parents, and policymakers in shaping effective learning experiences and fostering intellectual growth. By assessing mathematical proficiency, we gain invaluable insights into a person's cognitive abilities, problem-solving skills, and readiness for future academic and professional challenges.

Table 3 categorized the mathematics achievement of the respondents into different levels, with the majority falling into the "Satisfactory" level (60%). The mean score of 19.26 suggested an intermediate level of achievement within this sample, and the standard deviation of 4.69 indicated that there is some variability in individual achievement levels. This table offered an essential overview of the mathematics achievement of the surveyed group, which can help educators and researchers better understand the distribution of achievement levels and identify areas where additional support or interventions may be necessary to improve mathematics performance.

Table 3: Level of Mathematics Achievement of the Respondents

Level	Numerical Range	f	%
Outstanding	33-40	0	0.00
Very Satisfactory	25-32	5	10.00
Satisfactory	17-24	30	60.00
Fairly Satisfactory	9-16	14	28.00
Poor	0-8	1	2.00
Total		50	100.00
Mean		19.26	
St. Dev.		4.69	

5.3 Correlation Analysis between the Academic Strand Chosen and the Mathematics Achievement

This section presents the relationship between the respondents' academic strand chosen and mathematics, which is presented in Table 4.

Table 4: Correlation Analysis between the Academic Strand Chosen and the Mathematics Achievement

Variables	df	χ^2 -value	p - value	Decision	Remarks
SHS Strand Chosen and Mathematics Achievement	6	4.810	0.568	Do not reject Ho	Not Significant
*significant at $p < 0.05$ (two-tailed)					

Table 4 presented the results of a test examining the significant relationship between the chosen SHS strand and the mathematics achievement of the respondents. The analysis involved different SHS strands. The degrees of freedom (df) for this analysis were 6, and the calculated t-value was 4.810. The p-value associated with this test was 0.568. Following conventional significance levels ($\alpha = 0.05$), the decision based on the p-value was not to reject the null hypothesis, indicating that there is no statistically significant relationship between the chosen SHS strand and the mathematics achievement of the respondents.

Therefore, the findings suggested that the choice of the SHS strand does not significantly influence the mathematics achievement of the students in this study. These results are supported in previous research, which found that choosing a non-STEM strand is not significantly related to mathematics achievement. However, it has been found that students in the non-STEM strand had low performance in mathematics (Lee *et al.*, 2019; Metz, 2024; Óturai *et al.*, 2023). Hence, while non-STEM students often show lower mathematics achievement, evidence does not consistently prove a significant association between choosing non-STEM and mathematics achievement.

5.4 Correlation Analysis between the Academic Strand Chosen and the Mathematics Achievement

Table 5 presents findings from a test assessing the relationship between math interest and mathematics achievement among respondents. The computed r-value of 0.239 indicated

a negligible positive correlation between the variables. However, the p-value of 0.095, which is greater than the significance level of 0.05, leads to the failed rejection of the null hypothesis. Consequently, there is insufficient evidence to establish a significant relationship between math interest and mathematics achievement among the respondents.

Table 5: Correlation analysis between the math interest and the mathematics achievement

Variables	r-value	Strength of Correlation	p-value	Decision	Remarks
Math Interest and Mathematics Achievement	0.239	Negligible Positive	0.095	Do not reject Ho	Not Significant
*significant at $p < 0.05$ (two-tailed)					

This result is contradicted by the previous studies, which found that math interest predicts mathematics achievement (Fomina, 2017; Ili *et al.*, 2021; Zhang & Wang, 2020; Zheng *et al.*, 2025). Hence, there is robust and consistent evidence that students' interest in mathematics is significantly and positively related to mathematics achievement. The contradictory result of the study can be due to the respondents' point of view on mathematics, which could differ because it has been noted in the previous research that non-STEM students have low confidence in learning mathematics (Óturai *et al.*, 2023).

5.5 Test of Difference on the Math Interest among the Respondents When Grouped by the Academic Strand Chosen

Table 6: Test of Difference on the Math Interest of the Respondents

Source of Variation	Sum of Squares	Df	Mean Square	F-value	p-value	Remarks
Between Groups	347.421	3	115.807	3.979*	0.013	Significant
Within Groups	1338.659	46	29.101			
Total	1686.080	49				

Table 6 presents the results of One-way Analysis of Variance (ANOVA) examining the variation in math interest among respondents based on the academic strand chosen. With the computed F-value of 3.979 and p-value of 0.013, which is less than the significance threshold of 0.05, leading to the conclusion that the differences in math interest among SHS strands are statistically significant.

The result suggests that although the respondents belong to strands that are not primarily math-oriented, their levels of interest in the subject are not the same, which indicates that strand affiliation influences the students' perceptions and dispositions toward math. The variation of their interest may be attributed to the distinct curricular orientations of the strands and how mathematics is integrated in each strand. These findings imply that the academic strand significantly shapes students' math interest. Moreover, the choice of the SHS strand has a discernible effect on math interest among respondents. The findings underscored the importance of recognizing and addressing

diverse educational needs within different SHS strands, emphasizing the need for tailored strategies to cultivate math interest based on the chosen academic track.

6. Conclusion

Based on the findings of the study, it can be concluded that the students' choice of academic strand does not influence their mathematics achievement. This result underscores the importance of not relying on preconceived notions about students' strand affiliation when designing instructional approaches. Instead, all should be provided with equal opportunities and support to succeed in mathematics, regardless of their chosen academic track. On the other hand, students' math interest does not predict their math achievement. While interest is often regarded as a motivating factor, it must be nurtured alongside effective instructional strategies and adequate learning resources to translate into actual performance gains. Teachers should therefore focus on fostering both engagement and competence by employing active, contextualized, and learner-centered strategies that can transform students' initial curiosity or interest into meaningful academic success. However, the academic strand chosen by the students shapes their interest in math. This result highlights the need to recognize the diversity of student attitudes toward the subject. Teachers should adapt their methods to make mathematics more relevant to the learners' strand orientations, such as integrating real-life applications in social sciences for HUMSS, offering flexible approaches for GAS, and emphasizing technical and practical applications for TVL. By doing so, teachers can bridge the gap in math interest across strands and create a more inclusive and responsive mathematics learning environment.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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References

- Abragan, F., Abarcas, V., Aquino, I. M., & Bagongon, R. E. (2022). Research review on K-12 curriculum implementation in the Philippines: A generic perspective. *European Journal of Educational and Social Sciences*, 7(1), 1-8. <https://www.doi.org/10.5281/zenodo.7272126>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, 84(2), 191-215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Calingayan, F. (2025). Attitude Towards Mathematics and Academic Performance of Senior High School: Basis for an Intervention Program. *Journal of Interdisciplinary Perspectives*, 3(5), 325-336. <https://doi.org/10.69569/jip.2025.116>
- Cardinas, E. D. (2020). National Career Assessment Examination Result, Career Pathway Choices, and Career Guidance Program Implementation. *Journal of World Englishes and Educational Practices* 2(2). Retrieved from <https://al-kindipublisher.com/index.php/jweep/article/view/1609>
- Cerezo, A. T., Silleaz, G. M., & Abocejo, F. T. (2023). Policy Evaluation of the Department of Education K-12 Basic Education Program. *International Journal of Academic Pedagogical Research (IJAPR)* 7(4), 90-96. Retrieved from <https://www.evsu.edu.ph/university-research-and-created-works/policy-evaluation-of-the-department-of-education-k-12-basic-education-program/>

- Chan, T.-W., Cheet-Kit, L., & Chang, B. (2019). *IDC theory: creation and the creation loop*. Research and Practice in Technology-Enhanced Learning. <https://doi.org/10.1186/s41039-019-0120-5>
- Cheng, C. K., Chow, E. Y., Lam, K. C., & Lee, J. H. (2023). Participation in internship, professional competition and overseas exchange and accounting students' subsequent academic and job market performance. *The International Journal of Management Education*, 21(3). Retrieved from <https://doi.org/10.1016/j.ijme.2023.100887>
- Cherry, K. (2023). *What Is Reciprocal Determinism?* Retrieved from <https://www.verywellmind.com/what-is-reciprocal-determinism-2795907>
- Dumapias, A. & Tabuzo, V. (2018). Interest and confidence in Mathematics and Science: precursors in choosing the STEM strand. Retrieved on December 15, 2022, from <https://papers.ssrn.com/sol3/papers.cfm?abstractid=3359091>
- Fomina, T. (2017). Self-Regulation, Math Self-Efficacy, Math Interest and Mathematics Achievement, 4, 33. <https://doi.org/10.18844/PROSOC.V4I6.2909>.
- Gati, I., Levin, N., & Landman-tal, S. (2020). Decision-Making Models and Career Guidance. *International Handbook of Career Guidance*, 115-145. https://doi.org/10.1007/978-3-030-25153-6_6
- Gnec, M., & Erbas, A. K. (2019). Secondary Mathematics Teachers' Conceptions of Mathematical Literacy. *International Journal of Education in Mathematics, Science and Technology (IJEMST)*, 7(3), 222-237. Retrieved from https://www.researchgate.net/publication/334737013_Secondary_Mathematics_Teachers'_Conceptions_of_Mathematical_Literacy
- González-Salamanca, J. C., Agudelo, O. L., & Salinas, J. (2020). Key competences, education for sustainable development and strategies for the development of 21st-century skills. A systematic literature review. *Sustainability*, 12(24). <https://doi.org/10.3390/su122410366>
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Odessa, Fla.: Psychological Assessment Resources. Retrieved from <https://psycnet.apa.org/record/1997-08980-000>
- Huang, X., Zhang, J., & Hudson, L. (2019). Impact of math self-efficacy, math anxiety, and growth mindset on math and science career interest for middle school students: the gender moderating effect. *Eur J Psychol Educ*, 34, 621–640. <https://doi.org/10.1007/s10212-018-0403-z>
- Ili, L., Rumasoreng, M., Prabowo, A., & Setiana, D. (2021). Relationship between student learning interest and mathematics learning achievement: A meta-analysis. *Al-Jabar: Jurnal Pendidikan Matematika*. <https://doi.org/10.24042/ajpm.v12i2.9715>.
- Lazarides, R., & Gaspard, H. (2019). Dynamics of classroom motivation: Teacher enthusiasm and the development of math interest and teacher support. *Learning and Instruction*, 126-137. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0959475217303729#previe>
[w-section-abstract](https://www.sciencedirect.com/science/article/abs/pii/S0959475217303729#previe-w-section-abstract)

- Lee, Y., Capraro, R., & Bicer, A. (2019). Affective Mathematics Engagement: a Comparison of STEM PBL Versus Non-STEM PBL Instruction. *Canadian Journal of Science, Mathematics and Technology Education*, 1-20. <https://doi.org/10.1007/S42330-019-00050-0>.
- Mamolo, L. A., & Labina, C. S. (2025). A cross-sectional study on the secondary school students' subjective happiness and attitudes towards mathematics. *Journal of Education and Learning (EduLearn)*, 19(4), 2201-2211. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1482770.pdf>
- Metz, C. (2024). Defining Success for an Introductory Mathematics Non-STEM Pathway Course. PhD Dissertation. <https://doi.org/10.33915/etd.12534>.
- Óturai, G., Riener, C., & Martiny, S. (2023). Attitudes towards mathematics, achievement, and drop-out intentions among STEM and Non-STEM students in Norway. *International Journal of Educational Research Open*. <https://doi.org/10.1016/j.ijedro.2023.100230>.
- Peteros, E. D. (2024). Impact of pre-service teachers' self-regulation and self-efficacy on their mathematics performance in blended learning. *Journal of Education and Learning (EduLearn)*, 18(2), 526-534. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1430527.pdf>
- Peterors, E. D., Monteron, W. C., de Vera, J. V., Alcantara, G. A., Plando, D. B., & Fulgencio, M. D. (2022). Influence of Math Anxiety on the Academic Performance of Grade 7 Students in Mathematics. *International Journal of English and Education* 6(8).
- Quintos, C. A., Caballes, D. G., Gapad, E. M., & Valdez, M. R. (2020). Exploring Between SHS Strand and College Course Mismatch: Bridging the Gap Through School Policy on Intensified Career Guidance Program. *CiiT International Journal of Data Mining and Knowledge Engineering*, 12(10-12), 156. Retrieved from https://www.researchgate.net/publication/361081476_Exploring_Between_SHS_Strand_and_College_Course_Mismatch_Bridging_the_Gap_Through_School_Policy_on_Intensified_Career_Guidance_Program
- Redinger, L. (2017). *How Does Using a Student Interest Inventory Benefit Teachers and Teacher Candidates?* (Doctoral dissertation). Retrieved from <https://core.ac.uk/download/pdf/233576742.pdf>
- Shaeef, S. H., Salic, M., Adamat, L., Nabua, E., & Malayao, S. (2024). Localized STEM Lesson in Teaching Biodiversity for Grade 8 Learners. *Journal of Innovation, Advancement, and Methodology in STEM education*, 1(1), 13-22. Retrieved from <https://so13.tci-thaijo.org/index.php/IAMSTEM/article/view/591>
- Sheldon, K. M., & Holliday, G. (2019). Comparing Holland and Self-Determination Theory Measures of Career Preference as Predictors of Career Choice. *Sage Journals*. <https://doi.org/10.1177/1069072718823003>
- Scherrer, V., Preckel, F., Schmidt, I., & Elliot, A. J. (2020). Development of achievement goals and their relation to academic interest and achievement in adolescence: A

- review of the literature and two longitudinal studies. *Developmental Psychology*, 56(4), 795. <https://doi.org/10.1037/dev0000898>
- Shor, I. (2024). *Empowering education: Critical teaching for social change*. University of Chicago Press. Retrieved from https://books.google.ro/books/about/Empowering_Education.html?id=l6DpfoC6MpYC&redir_esc=y
- Ulfah, M. (2023). The Impact of Life Skills and Self-confidence Education on the Development of Independent and Work-ready Human Resources. *Kabillah: Journal of Social Community*, 8(2), 270-278. Retrieved from <https://www.ejournal.iainata.ac.id/index.php/kabilah/article/view/390>
- Wen, R., & Dubé, A. K. (2022). A systematic review of secondary students' attitudes towards mathematics and its relations with mathematics achievement. *Journal of Numerical Cognition*, 8(2), 295-325. Retrieved from <https://jnc.psychopen.eu/index.php/jnc/article/view/7937>
- Yee, K. M. (2022). The Changing Landscape of the Philippine Higher Education: Going Beyond the Public and Private Debate. *Issues in Philippine Higher Education*, 1.
- Zhang, D., & Wang, C. (2020). The relationship between mathematics interest and mathematics achievement: mediating roles of self-efficacy and mathematics anxiety. *International Journal of Educational Research*, 104, 101648. <https://doi.org/10.1016/j.ijer.2020.101648>.
- Zheng, P., You, Y., & Luo, G. (2025). Math Interest on Primary School Students' Mathematics Achievement: Self-Control/Resilience Chain Mediation. *Journal of Psychoeducational Assessment*. <https://doi.org/10.1177/07342829251326435>.