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# Tracing the Senior High School Strand Effect: Performance of First-Year BSE-Mathematics Students in Mathematics in the Modern World

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**ABSTRACT**

The Philippine K to 12 curriculum introduced specialized Senior High School (SHS) strands: STEM, ABM, HUMSS, GAS, and TVL, aimed at preparing learners for higher education and future careers. For mathematics-intensive programs like the Bachelor of Secondary Education (BSE) major in Mathematics, the SHS strand may influence students' readiness for general education courses such as Mathematics in the Modern World (MMW). This study determined whether the SHS academic strand significantly affects the MMW performance of first-year BSE Mathematics students. A quantitative-comparative and correlational research design was employed, involving 56 respondents from Eulogio "Amang" Rodriguez Institute of Science and Technology during Academic Year 2024–2025. Data were obtained from official school records. Descriptive statistics described the strand distribution and performance, ANOVA tested group differences, and Pearson's correlation determined relationships. Results showed that most students came from STEM (33.93%), followed by HUMSS (26.79%), ABM (21.43%), GAS (14.29%), and TVL (3.57%). STEM students obtained the highest mean grade (92.95, Very Superior), while TVL recorded the lowest (82.25, Satisfactory). ANOVA revealed a significant difference in MMW performance ($F = 3.73$, $p < .05$), and Pearson's correlation showed a strong relationship ($r = .812$) between strand and performance. Findings conclude that the SHS strand plays a substantial role in mathematics readiness. Bridging programs, diagnostic assessments, and strengthened mathematics components in non-STEM strands are recommeded.

**Keywords:** *Education; Academic strand, Mathematics performance; Quantitative research, Philippines*

## INTRODUCTION

The Philippine K to 12 programs restructured the education system to include specialized Senior High School (SHS) strands to prepare students for tertiary education and future employment. The STEM, ABM, HUMSS, GAS, and TVL strands each offer specialized curricula aligned with specific academic or vocational pathways (Commission on Higher Education [CHED], 2013).

Mathematics in the Modern World (MMW) is a general education subject designed to cultivate quantitative reasoning and logical thinking through the application of mathematics in real-life contexts. However, BSE Mathematics students enter college from various SHS strands, some of which have limited mathematics content, potentially affecting their preparedness for college-level mathematics (Delos Santos, 2021).

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This study examined whether the SHS academic strand significantly influences first-year BSE Mathematics students' performance in Mathematics in the Modern World (MMW), providing a basis for interventions aimed at supporting students from non-STEM strands.

## METHODS

### Research Design

A quantitative-comparative and correlational design was utilized to compare Mathematics in the Modern World (MMW) performance across SHS strands and determine the relationship between strand and academic performance.

### Participants

The respondents were 56 first-year BSE-Mathematics students from the College of Education, Eulogio "Amang" Rodriguez Institute of Science and Technology, enrolled during Academic Year 2024–2025.

### Data Gathering Procedure

SHS strand data were gathered from enrollment documents, while Mathematics in the Modern World (MMW) grades were obtained from certified academic records.

### Data Analysis

Descriptive statistics (frequency, percentage, and weighted mean) were computed. A one-way ANOVA determined differences among strands, and Pearson's correlation assessed the relationship between strand and MMW performance.

## RESULTS AND DISCUSSION

### Sub-Problem No.1. What are the SHS academic strands of the BSE – Mathematics 1 students?

As presented in Table 1, most of BSE-Mathematics 1 students were from Science, Technology, Engineering, and Mathematics (STEM) with 19 or 33.93 percent, followed by Humanities and Social Sciences (HUMSS) strand with 15 or 26.79 percent, Accountancy, Business, and Management (ABM) with 12 or 21.43 percent, General Academic Strand (GAS with 8 or 14.29 percent, and Technical-Vocational-Livelihood (TVL) with 2 or 3.57 percent.

Table 1. *Distribution of Respondents by SHS Strand*

| SHS Strand | Frequency | Percentage |
|---|---|---|
| Science, Technology, Engineering, and Mathematics (STEM) | 19 | 33.93 |
| Accountancy, Business, and Management (ABM) | 12 | 21.43 |
| Humanities and Social Sciences (HUMSS) | 15 | 26.79 |
| General Academic Strand (GAS) | 8 | 14.29 |
| Technical-Vocational-Livelihood (TVL) | 2 | 3.57 |
| Total | 56 | 100 |

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**Sub-Problem No.2. What is the performance of first-year BSE Mathematics students in Mathematics in the Modern World?**

Table 2. *Performance in MMW per SHS Strand*

| SHS Strand | Average | Interpretation |
|---|---|---|
| Science, Technology, Engineering, and Mathematics (STEM) | 92.95 | Very Superior |
| Accountancy, Business, and Management (ABM) | 91.36 | Very Superior |
| Humanities and Social Sciences (HUMSS) | 84.03 | Satisfactory |
| General Academic Strand (GAS) | 89.00 | Very Good |
| Technical-Vocational-Livelihood (TVL) | 82.25 | Satisfactory |

Legend:

| Grade Point Equivalence | Verbal Interpretation | Equivalence |
|---|---|---|
| 1.00 | Mark Excellent | 97-100 |
| 1.25 | Excellent | 94-96 |
| 1.50 | Very Superior | 91-93 |
| 1.75 | Superior | 91-93 |
| 2.00 | Very Good | 88-90 |
| 2.25 | Good | 85-87 |
| 2.50 | Satisfactory | 82-84 |
| 2.75 | Fair | 79-81 |
| 3.00 | Passed | 76-78 |
| 4.00 | Conditional Failure | 73-75 |
| 5.00 | Failed | 70-72 |
| | Incomplete | Below 70 |

As revealed in Table 2, STEM students achieved the highest mean grade (92.95, Very Superior), followed by ABM (91.36, Very Superior), GAS (89.00, Very Good), HUMSS (84.03, Satisfactory), and TVL (82.25, Satisfactory).

Sub-Problem No.3. Is there a significant difference in the MMW performance of students when grouped according to their SHS strand?

Given in Table 3, the computed f-value of 3.73 was more than the critical value of 2.56 at the 0.05 level of significance; therefore, there was a statistically significant difference in the Mathematics in the Modern World performance among students from different SHS strands.

Table 3. *Significant Difference*

| Variables | SS | df | MS | F- Computed Value | F-critical Value at .05 | Interpretation | Decision |
|---|---|---|---|---|---|---|---|
| Between Groups | 820.57 | 4 | 205.14 | 3.73 | 2.56 | Significant | Reject Ho |
| Within Groups | 2800 | 51 | 54.90 | | | | |

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**Sub-Problem No.4. Is there a significant relationship between the SHS academic strand and students ' performance in Mathematics in the Modern World?**

As presented in Table 4, the computed correlation value of .812 was higher than the critical value of 0.878 at 5% significance level with 3 degrees of freedom. This indicates a significant relationship, rejecting the hypothesis. A strong correlation exists between the SHS academic strand and students ' performance in Mathematics in the Modern World.

Table 4. *Significant Relationship*

| Variables | Correlation Ratio | Critical Value at .05 | df | Interpretation | Decision |
|---|---|---|---|---|---|
| SHS academic strand and students' performance in Mathematics in the Modern World | .812 | .878 | 3 | Significant | Reject $H_o$ Strong Correlation |

*Guide in interpreting the coefficient of correlation*

| | |
|---|---|
| 0.90 to 1 | - Very Strong Correlation |
| 0.70 to 0.89 | - Strong Correlation |
| 0.40 to 0.69 | - Moderate Correlation |
| 0.10 to 0.39 | - Weak Correlation |
| 0.00 to 0.09 | - Negligible Correlation |

The results indicate that students from STEM and ABM strands perform better in Mathematics in the Modern World (MMW) than their HUMSS, GAS, and TVL counterparts. The strong mathematical foundation in STEM and the analytical skills emphasized in ABM may explain their superior performance (Panaligan & Madrigal, 2017). Students from strands with limited mathematics exposure may need additional academic support to succeed in mathematics-intensive courses.

The strong correlation aligns with previous studies (Delos Santos, 2021; Panaligan & Madrigal, 2017), confirming that the SHS strand can predict mathematics performance in higher education. These findings highlight the need for bridging programs and differentiated instruction tailored to students' mathematical readiness.

## CONCLUSION

1. STEM strand students attained the highest performance in Mathematics in the Modern World (MMW), while HUMSS and TVL had the lowest.
2. Significant differences in Mathematics in the Modern World (MMW) performance exist among Senior High School (SHS) strands.
3. A strong positive correlation exists between the Senior High School (SHS) strand and Mathematics in the Modern World (MMW) performance.

**Recommendations**

- Implement bridging programs for non-STEM students.
- Conduct diagnostic assessments for incoming students to determine readiness.
- Strengthen mathematics components in non-STEM Senior High School (SHS) curricula.
- Use differentiated instructional strategies in Mathematics in the Modern World (MMW), to address varying levels of preparedness.

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