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Multivariate Analysis: Teachers' Attitudes, Students' Interests, Intrinsic Motivation on Students' Learning Outputs

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ABSTRACT

This study examined how teachers' attitudes, students' interests, and intrinsic motivation influence students' learning outputs in mathematics. It addressed the challenge of improving learning outputs amidst the Philippines' education crisis, shaped by traditional teaching methods and socioeconomic barriers. Using a descriptive-correlational design, 156 first-year mathematics students were selected through purposive random sampling. Data were collected via an adapted questionnaire and analyzed using multiple regression, Pearson correlation, standard deviation, and mean. Results revealed a significant positive relationship between supportive teacher attitudes, increased student interest, and intrinsic motivation in enhancing learning outputs. The findings highlight the need to foster learner-centered, interest-driven, and intrinsically motivating environments. Education practitioners should adopt strategies encouraging autonomous thinking and engagement. Future research could explore targeted interventions to strengthen motivation and interest across diverse educational contexts.

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Introduksiyon

Teachers' positive attitudes significantly enhance learning environments, fostering student engagement and boosting academic performance. Research shows that supportive teacher attitudes create a conducive and motivating learning atmosphere for improving student

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success (Fuad, 2021). Conversely, negative attitudes can diminish students' motivation and academic performance, lowering learning outputs. These challenges resonate worldwide, as low student performance is often linked to insufficient motivation, interest, and preparation (Wu & Xin, 2019). Additionally, factors like unrealistic goals, cognitive misunderstandings, emotional instability, and personal challenges have been linked to poor academic performance.

The education system faces pressing challenges in the Philippines, as evidenced by the 2018 Programme for International Student Assessment (PISA) results, where Filipino students ranked last in mathematics proficiency. Less than 20% achieved Level 2 proficiency, while over 50% scored at Level 1 or below, revealing substantial gaps in foundational mathematical skills. This highlights the urgent need for innovative teaching strategies to foster interest and motivation among Filipino students (Bernardo et al., 2022).

Locally, Davao City reflects the national trend, with students exhibiting low performance in mathematics due to insufficient interest and motivation. According to Galabo et al. (2018), regional assessments indicate that a lack of intrinsic motivation and teacher support negatively impacts student engagement and learning outputs. Ladrero et al. (2020) noted that improving student interest and intrinsic motivation is critical to addressing the persistent gaps in mathematical achievement in the region.

This research examines the relationship between teacher attitudes, student interest, and intrinsic motivation and their combined influence on learning outputs. While existing studies have explored the individual effects of these factors, this study investigates how they interact and collectively impact student learning outputs in mathematics. By addressing these factors, the study seeks to provide actionable insights into fostering supportive, motivating, and learner-centered educational environments, enhancing student engagement and academic outputs. The findings will inform effective teaching strategies for improving student performance.

Theoretical Framework

This study is grounded in several theories that explain how teacher attitudes, student interest, and intrinsic motivation influence learning outputs. These frameworks provide a basis for understanding the hypothesized relationships in this research.

Ajzen's (1991) Theory of Planned Behavior (TPB) posits that attitudes, subjective norms, and perceived behavioral control shape intentions and behaviors. Applied here, TPB suggests that positive teacher attitudes create a supportive classroom environment, fostering student engagement and participation, which significantly impacts learning outputs. Chan et al.'s (2019) Interest-Driven Creator (IDC) Theory emphasizes that student engagement and creativity are fueled by genuine interest. Students interested in the curriculum actively generate ideas and solutions, boosting their academic performance. This theory frames

student interest as a key driver of learning outputs. Deci and Ryan's (1985) Self-Determination Theory (SDT) focuses on intrinsic motivation, proposing that students achieve higher academic success when their psychological needs for autonomy, competence, and relatedness are met. Intrinsic motivation directly influences student engagement and performance, contributing to improved learning outputs.Ames' (1992) Achievement Goal Theory (AGT) explores how mastery-oriented academic goals enhance performance by focusing on learning rather than external validation. This theory underscores the role of internal objectives in shaping outputs. These theories provide an integrated framework for understanding the interplay between teacher attitudes, student interest, intrinsic motivation, and their combined impact on learning outputs. This study hypothesizes that positive teacher attitudes, increased student interest, and inherent motivation collectively enhance learning outputs.

Figure 1

Diagrammatic Framework of the Study

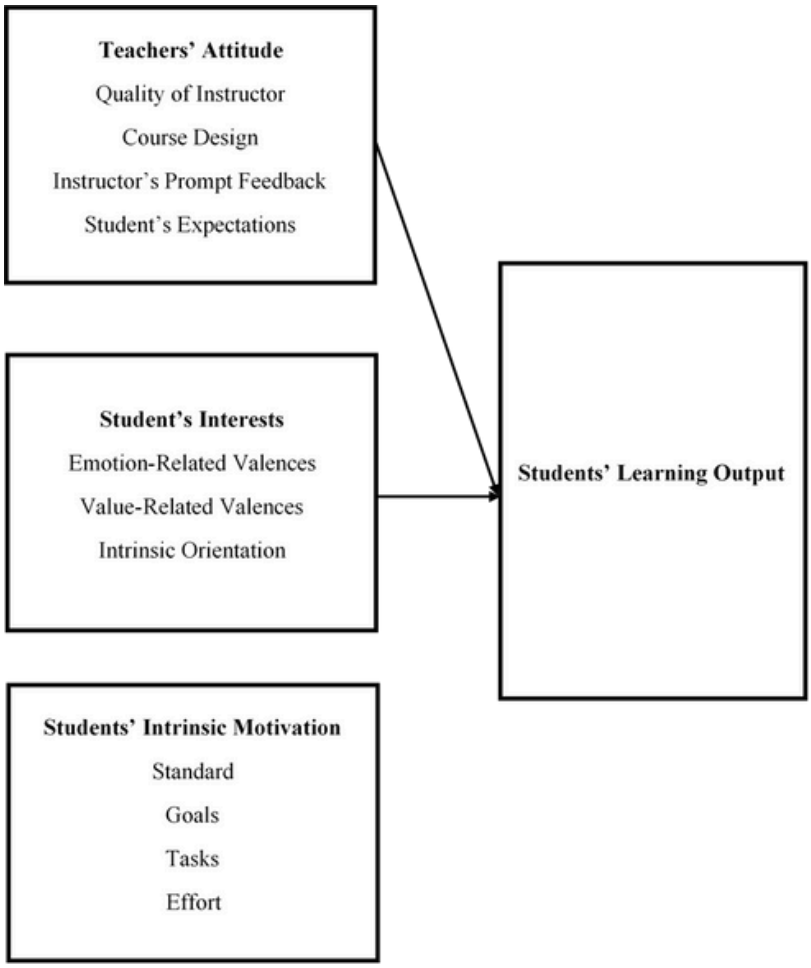

Figure 1 shows the relationships between teachers' attitudes, students' interests, intrinsic motivation, and learning outputs. The study suggests that teachers' attitudes — including quality instruction, course design, feedback, and alignment with expectations — positively affect student learning outputs. Students' interests, emotional connections, and intrinsic motivation drive active learning participation. Intrinsic motivation, shaped by standards, goals, task focus, and effort, enhances learning by fostering persistence. The framework hypothesizes that these factors interact dynamically, improving academic performance and highlighting the interconnected roles of both teacher and student-related variables in learning success.

Review of Related Literature

The Influence of Teachers' Attitudes on Student Learning Outputs

Teachers' attitudes significantly influence students' learning outputs by fostering a supportive environment that motivates active participation and enhances academic achievement (Ekperi et al., 2019). A teacher's supportive and passionate demeanor has been shown to boost student motivation, a key factor in improved learning outputs (Goss, 2022). Furthermore, teacher efficacy - the belief in one's ability to positively impact students- is critical in increasing student engagement and performance (Brandmiller et al., 2023). These align with Ajzen's (1991) Theory of Planned Behavior, which posits that attitudes shape behavior. Passionate and committed teachers nurture students' intrinsic motivation, leading to better academic results.

However, while research highlights the importance of teacher attitudes, there is limited understanding of their specific impact on disciplines requiring critical thinking. Most studies focus on general education, overlooking challenging subjects. This study addresses this gap by exploring how teacher attitudes influence learning outputs in complex subjects like mathematics.

Student's Interests in Learning

Student interest plays a vital role in fostering a productive learning environment. Harackiewicz et al. (2016) define interest as focused attention, emotional engagement, and a lasting desire to explore a subject, which is key to long-term academic success (Moneva & Gonzaga, 2020). Parental involvement, an important environmental factor, boosts intrinsic motivation and student interest in academic tasks (Essien et al., 2015). Aligning student interests with teaching methods, however, can be challenging. Rone et al. (2023) found that a mismatch between personal interests and the prescribed curriculum often leads to disengagement. Nevertheless, active learning strategies have increased motivation and academic understanding, particularly in younger students (Fadilah & Alwi, 2020).

There remains a research gap regarding how educators can effectively integrate students' interests with the curriculum to prevent disengagement, particularly in secondary education settings. The current study addresses this gap by exploring methods that can better align teaching practices with students' interests, fostering greater engagement in learning.

Students' Intrinsic Motivation

Intrinsic motivation, the internal drive to engage in tasks for personal satisfaction or enjoyment, is a key predictor of academic success (Affuso et al., 2022). Liu et al. (2020) suggest that intrinsic motivation fosters persistence, focus, and self-expression, all contributing to improved academic performance. According to Deci and Ryan's (2020) Self-Determination Theory, students are more likely to be intrinsically motivated when their psychological needs for autonomy, competence, and relatedness are fulfilled, resulting in higher academic achievements. A supportive learning environment that nurtures these needs enhances intrinsic motivation and student performance (Hafızoglu & Yerdelen, 2019).

However, research by Meng and Hu (2023) highlights intrinsic motivation's benefits and potential drawbacks , such as over-engagement or burnout in high-stakes academic tasks. While inherent motivation positively impacts academic performance, limited studies address its long-term effects in secondary education. There is a pressing need to explore strategies for sustaining students' motivation during prolonged demanding coursework without triggering burnout.

While existing literature provides substantial insights into the role of teacher attitudes, student interest, and intrinsic motivation in shaping academic outputs, significant gaps remain. Specifically, further research is needed on the impact of teacher attitudes in critical thinking disciplines, effective strategies for aligning student interests with curriculum and maintaining intrinsic motivation in challenging subjects over time. This study seeks to contribute to these areas, focusing on improving secondary education academic outputs.

Purposes of the Study

This study examines the relationship between teachers' attitudes, students' interest, and intrinsic motivation and their collective impact on the learning outputs of first-year mathematics students for the academic year 2023-2024. Specifically, the study aims to:

1. What is the level of the teachers in terms of:
    1.1 Quality Instruction;
    1.2 Course Design;
    1.3 Instructor's Prompt Feedback;
    1.4 Student's Expectation?

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   1.1 Quality Instruction;
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   1.4 Student's Expectation?

2. What is the level of students' Interests in terms of:
   2.1 Emotion-Related Valences;
   2.2 Value-Related Valances;
   2.3 Intrinsic Orientation?

3. What is the level of students' Intrinsic Motivation in terms of:
   3.1 Standard;
   3.2 Goals;
   3.3 Tasks;
   3.4 Efforts?

4. What is the level of students learning outputs of the first-year BSED Mathematics students?

5. Is there a significant relationship of the students' learning outputs between;
   5.1 Teachers' Attitudes;
   5.2 Students' Interest;
   5.3 Students' Intrinsic motivation?

6. Which domains of teacher's attitudes, students' interest and students ' intrinsic motivation significantly predict the students learning outputs?

Methodology

Research Design

This study uses a quantitative research design with a descriptive correlational approach to systematically and objectively analyze relationships among variables. The descriptive correlational approach explores relationships between variables without manipulation or inferring causation, clearly depicting observed associations (Seeram, 2019). This method identifies patterns, trends, and differences by employing various research tools to examine how variables naturally relate within real-world contexts (Thomas et al., 2023).

Research Design

The study involved 156 first-year mathematics students from Davao de Oro State College for the 2023–2024 school year, selected through purposive sampling. Inclusion criteria required participants to be officially enrolled as first-year mathematics students, taking at least one mathematics course, actively attending classes, and providing informed consent. This sampling ensured a representative group aligned with the study's objectives. A

Tiniminimum sample size of 100 was deemed sufficient for meaningful analysis, as Bullen & Bullen (2022) recommended, making the chosen sample size appropriate for reliable data collection.yak din na manatiling obhektibo sa pagsusuri at pagpapakahulugan na inilayo ang mga personal na pagkiling sa paksa ng pag-aaral.

Instruments

This study employed an adapted survey questionnaire administered to 156 respondents. To assess teachers' attitudes, the researchers used Gopal et al.'s (2021) 20-item questionnaire, categorized into quality instruction (7 items), course design (5), prompt feedback (3), and student expectations (5). For interest, Neurohret et al.'s (2023) 18-item questionnaire included feeling-related valences (7), value-related valences (7), and intrinsic orientation (4). For intrinsic motivation, Njiru's (2003) 19-item questionnaire focused on standards (3), goals (5), tasks (6), and effort (5). For learning outputs, Lichtenstein's (2011) RBOQ comprised 19 items. Experts in mathematics and English education evaluated the questionnaires for content and validity. The questionnaire also underwent pilot testing to refine the items and confirm reliability and consistency, as detailed in Table 1.

Table 1

Reliability Test Results

Siday	Linya/Saknong	Kategorya	Tema
Teacher Attitude	*0.940*	Excellent	20
Student Interest	*0.888*	Good	18
Intrinsic Motivation	*0.971*	Excellent	19
Learning Outputs	*0.932*	Excellent	19

Data Gathering and Analysis

Phase 1: Pre-survey

Before conducting the survey, the researchers obtained approval from the Research Ethics Committee (REC) of Davao de Oro State College to ensure ethical compliance. The researchers then obtained formal authorization from the campus directors to proceed with the study. Three experts validated the survey instruments, and necessary revisions were made based on feedback. Informed consent was obtained from participants, ensuring their participation was voluntary and their responses confidential.

Phase 2: Survey Proper

The survey was administered to 156 first-year mathematics students at Davao de Oro State College for the 2023-2024 academic year. Data collection occurred from March 23, 2024, to April 11, 2024. During this phase, the researchers conducted face-to-face surveys while adhering to established safety protocols. Students were allotted one hour to complete the questionnaire, which focused on teacher attitudes, student interests, and intrinsic motivation. To ensure accurate and comprehensive responses, the researchers provided clear instructions. The survey instruments were distributed to the participants and collected afterwards, ensuring proper retrieval of all completed questionnaires.

Phase 3: Post-survey (Data Collection, Retrieval, and Cleaning)

After collecting the completed questionnaires, the data were organized and cleaned. The researchers ensured all responses were valid, removing incomplete or inconsistent data. The final dataset was then prepared for analysis. Once this was completed, the cleaned data was forwarded to the statistician for further processing. The statistician performed the necessary statistical analyses to ensure accurate interpretation of the results before proceeding to the final phase of the study.

Data Analysis

The collected data were analyzed using descriptive and inferential statistical techniques. The analysis began with calculating the mean and standard deviation to understand the central tendency and variability of the responses. Pearson correlation was conducted to assess the strength and direction of relationships between teachers' attitudes, students' interests, intrinsic motivation, and students' learning outputs. Multiple regression analysis was used to determine whether the domains of teachers' attitudes, student interests, and intrinsic motivation significantly predicted learning outputs. The statistical significance level was set at .05. The researchers utilized these methods to rigorously evaluate the relationships among the variables and draw conclusions about their influence on student learning outputs.

Results and Discussion

This presents and analyzes the data gathered from the study respondents, examining the relationships between teachers' attitudes, student interests, intrinsic motivation, and their influence on students' learning outputs.

Teachers' Level of Attitudes in Terms of Quality Instruction, Course Design, Prompt Feedback for Students

Table 2 shows teachers' attitudes across four indicators: *quality instruction, course design, prompt feedback, and student expectations*. The course design has the highest weighted mean, rated as very high, along with the other indicators.

Table 2

Level of Teachers' Attitudes

Indicator	Mean	SD	Verbal Interpretation
Quality Instruction	*4.26*	.587	Very High
Course Design	*4.29*	.571	Very High
Prompt Feedback for Students	*4.21*	.675	Very High
Student Expectation	*4.22*	.652	Very High
Overall Teacher Attitude	*4.24*	.559	Very High

**4.20 and 5.00 - Strongly Agree (very high), 3.40 to 4.19 - Agree (high), 2.60 to 3.39 - Neutral (moderate), 1.80 to 2.59 - Disagree (low), and 1.00 to 1.79 - Strongly Disagree (very low)*

Table 2 reveals that teachers' attitudes are highly rated, with course design scoring the highest at 4.29, followed by *quality instruction* (4.26), *student expectations* (4.22), and *prompt feedback* (4.21). The overall teacher attitude score is 4.24, reflecting strong performance in these areas. The data trend suggests that teachers focus on structured, student-centered lessons, with room for improvement in providing consistent feedback. These results reflect teachers' commitment to delivering organized lessons and clear expectations. However, the slightly lower feedback score indicates a need for more consistent and timely feedback to enhance student engagement. Research by Saavedra and Del Toro Mijares (2024) supports the idea that structured lessons and clear goals are essential for student success.

Students' Level of Interest in Terms of Feeling-Related Valences, Value-Related Valences, and Intrinsic Orientation

Table 3 shows students' interest levels across three indicators: Feeling-related valence, value-related valence, and intrinsic orientation. Value-related valences and other indicators have the highest weighted mean and are rated as high.

Table 3

Level of Teachers' Attitudes

Indicator	Mean	SD	Verbal Interpretation
Feeling-Related Valences	3.84	0.650	High
Value-Related Valences	3.92	0.640	High
Intrinsic Orientation	3.74	0.727	High
Overall Students' Interest	3.83	0.606	High

**4.20 and 5.00 - Strongly Agree (very high), 3.40 to 4.19 - Agree (high), 2.60 to 3.39 - Neutral (moderate), 1.80 to 2.59 - Disagree (low), and 1.00 to 1.79 - Strongly Disagree (very low)*

Table 3 shows high levels of student interest in three key areas: *feeling-related valences, value-related valences, and intrinsic orientation*, with mean scores ranging from 3.74 to 3.92. This trend suggests that students are emotionally engaged with the material, recognize its value, and are intrinsically motivated. The slightly lower score in intrinsic orientation indicates an opportunity to enhance self-driven engagement further. Students show strong emotional involvement and perceive the relevance of their studies for personal growth and future goals, reflecting high emotional and moral motivation. These findings align with research highlighting the role of emotional engagement and personal relevance in promoting deeper learning and sustained motivation (Liu et al., 2024). Educators should link academic content to students' values and aspirations to sustain motivation, fostering greater self-driven engagement and long-term academic commitment.

Students Level of Intrinsic Motivation in Terms of Standard, Goals, Tasks, and Effort

Table 4 presents students' intrinsic motivation levels across *standards, goals, tasks, and effort*. Results show that the standard has the highest weighted mean, which is verbally interpreted as high, along with the other indicators.

Table 4

Level of Intrinsic Motivation

Indicator	Mean	SD	Verbal Interpretation
Standard	4.01	0.710	High
Goals	4.00	0.685	High
Tasks	3.96	0.667	High
Effort	4.08	0.753	High
Overall Intrinsic Motivation	4.01	0.636	High

**4.20 and 5.00 - Strongly Agree (very high), 3.40 to 4.19 - Agree (high), 2.60 to 3.39 - Neutral (moderate), 1.80 to 2.59 - Disagree (low), and 1.00 to 1.79 - Strongly Disagree (very low)*

Table 4 shows strong intrinsic motivation among students, with mean scores of 3.96 to 4.08 across four indicators. Hence, students set high personal standards, align with academic goals, and invest significant effort. However, variability in sustained engagement suggests a need for strategies to maintain motivation. The lower score for task motivation points to an area for improvement in fostering interest in specific activities. These findings emphasize the need for tailored support to enhance and sustain student motivation.

The results show that students are self-motivated and driven by their standards and goals, which inspire them to work hard and enjoy academic challenges. Their commitment to success comes from a desire for personal growth and academic autonomy, not external

rewards. The results show that students are self-motivated and driven by their standards and goals, which inspire them to work hard and enjoy academic challenges. Their commitment to success comes from a desire for personal growth and academic autonomy, not external rewards. This suggests that student's motivation to learn is rooted in their internal drive, leading them to engage with their studies for personal fulfilment. Students with strong self-belief, high task value, and clear learning goals tend to perform better academically. These factors are stronger predictors of success than IQ or previous academic achievements. Intrinsically motivated students who seek personal growth and autonomy work harder and enjoy learning more, improving their academic performance and engagement (Steinmayr et al., 2019).

Level of Students' Learning Output

Table 5 presents students' learning output levels following the Research Based Outcomes Questionnaire (RBOQ). The following items measured the personal qualities and acquired learning.

Table 5

Level of Intrinsic Motivation

Leaning Output	Mean	SD	Verbal Interpretation
Overall	4.02	.611	High

The students' learning outputs indicate a high level of academic performance, with an overall mean score of 4.02 and a standard deviation of 0.611. This suggests that students are highly engaged in their learning, excelling in critical thinking, writing, research, teamwork, and leadership. The relatively low standard deviation signifies that most students had similar experiences, indicating a strong consistency in their academic achievements. For example, students demonstrated substantial improvements in analytical thinking (M=4.08, SD=0.857) and teamwork (M=4.26, SD=0.784), reflecting a solid grasp of these essential skills. However, there was slightly more variation in the responses for leadership skills, with "Improved my ability to run meetings" (M=3.77, SD=0.777) showing lower mean scores and a wider spread in experiences.

The data reveals that students' academic success is not only due to the knowledge acquired but also their intrinsic motivation, as they focus on mastery goals, seeking to improve and develop skills rather than simply aiming to outperform others. This aligns with the Achievement Goal Theory (Ames et al., 1970), where mastery goals lead to greater intrinsic motivation and higher academic achievement. Furthermore, the findings are supported by research such as Han et al. (2021), who emphasized the importance of self-efficacy and career awareness in student success. These results highlight the value of fostering intrinsic motivation and engagement to enhance students' learning outputs.

Significant Relationship between Teachers' Attitude, Students' Interests, and Intrinsic Motivation on Students' Learning Outputs

Table 6

Relationship between the Study Variables and Learning Outputs

Variable	Mean	SD	r	p	Verbal Interpretation
Teachers' Attitude	4.24	.559	.626	<0.001	Significant
Student's Interest	3.83	.606	.762	<0.001	Significant
Intrinsic Motivation	4.01	.636	.806	<0.001	Significant

**significant @p< .01*

The study revealed strong connections between teachers' attitudes, students' interests, intrinsic motivation, and learning outputs. Teachers' attitudes positively correlated with student learning outputs ($M = 4.24$, $SD = 0.559$, $r = 0.626$, $p < .001$), indicating that positive teacher attitudes significantly influence student performance. Students' interest showed a strong relationship with effective learning outputs ($M = 3.83$, $SD = 0.606$, $r = .762$, $p < .001$), emphasizing the importance of engaging students to enhance learning. Intrinsic motivation strongly correlated with learning outputs ($M = 4.01$, $SD = 0.636$, $r = .806$, $p < .001$), highlighting its pivotal role in student achievement. These factors work synergistically to foster positive learning environments and improve essential skills such as problem-solving and retention (Wu et al., 2024).

The results are context-specific, limiting their applicability, as socio-economic, cultural, and academic factors influence these relationships. Howard et al. (2021) suggest that motivation's effect on learning outputs varies with internal and external factors. High teacher expectations can boost motivation but may negatively affect low achievers due to the effect of self-fulfilling prophecy (SFP) (Nel, 2016). Additionally, motivational strategies' effectiveness depends on emotional responses and content relevance, often outweighing teacher expectations alone (Hornstra et al., 2018). Thus, these factors' impact varies based on context and individual differences.

Key Domains of Teacher's Attitudes, Students' Interests, Intrinsic Motivation Predicting Students' Learning Outputs

Table 7

Influence of Teacher's Attitudes, Students' Interests, Intrinsic Motivation on Students' Learning Outputs

Variable	Unstandardized Coefficients		Standardized Coefficients	p	Verbal Interpretation
	B	SE	Beta (β		
(Intercept)	1.1168	.304		3.845	.000***
Quality Instruction	.059	.122	.056	.482	.631
Course Design	.179	.129	.167	1.384	.168
Prompt Feedback	.199	.094	.220	2.109	.037***
Student Expectation	.236	.104	.252	2.272	.025***
(Intercept)	.929	.202		4.590	.000***
Feeling-Related Valences	.220	.072	.234	3.078	.002
Value-Related Valences	.520	.080	.545	6.501	<.001
Intrinsic Orientation	.056	.067	.066	.824	.411
(Intercept)	.923	.187		4.944	.000***
Standard	.044	.067	.051	.658	.512
Goals	.339	.081	.380	4.174	<.001
Tasks	.190	.078	.207	2.424	.017
Effort	.200	.072	.246	2.755	.007

Constant=1.168, F (4,151) =24.831*, p<.001, R2=.397*
Constant=.929, F (3,152) =80.789*, p<.001, R2=.615*
Constant=.923, F (4,151) =74.505*, p<.001, R2=.664*

The regression analysis revealed key predictors of students' learning outputs, emphasizing academic and emotional factors. Teachers' attitudes, particularly *prompt feedback* (B = .199, p = .037) and *student expectations* (B = .236, p = .025), significantly influenced learning outputs, highlighting the importance of timely feedback and aligning student expectations with the learning environment. In contrast, *quality instruction* (p = .631) and *course design* (p = .168) were not significant predictors, suggesting that feedback and expectation alignment have a

more immediate impact on student learning. These findings stress the importance of consistent feedback and clear expectations in fostering motivation and engagement.

Further analysis revealed that *value-related valences* significantly influenced learning outputs (B = .520, p < .001), suggesting that students who find their education meaningful and relevant are more committed and likely to achieve better academic results. Feeling-related valences also positively impacted (B = .220, p = .002), highlighting the importance of emotional connections to learning. Intrinsic motivation was not a significant predictor (B = 0.056, p = 0.411), implying that emotional and value-related factors strongly influence performance rather than intrinsic motivation alone. Teachers should focus on creating emotional connections and emphasizing the value of education to improve student engagement and achievement (Tan et al., 2021; Garcia, 2020).

The analysis showed that *goals, tasks, and effort* significantly influenced learning outputs, with Goals being the strongest predictor (B = .339, p < .001), *tasks* (B = .190, p = .017), and *effort* (B = .200, p = .007) also positively impacted academic success, emphasizing the role of personal motivation. Conversely, *standards* were not a significant predictor (B = .044, p = .512), suggesting that self-driven goals and effort are more influential than external standards. These findings highlight the importance of goal-setting, task engagement, and effort for academic success, supporting self-regulated learning (Dunlosky et al., 2020; Malmberg et al., 2022;). Teachers should encourage students to set goals and stay engaged to enhance learning outputs.

The regression analysis emphasizes that feedback, student expectations, emotional connections, value-related perceptions, goal-setting, and effort significantly influence learning outputs. These findings suggest that educators should prioritize a supportive learning environment that addresses academic and emotional needs to improve student performance.

Conclusion and Recommendations

This study examines the relationship between teachers' attitudes, students' interests, and intrinsic motivation in first-year mathematics students to understand their influence on learning outputs. By exploring these factors, the research aims to enhance teacher-student interactions and align lessons with students' interests, fostering improved academic success.

The results show that teachers' attitudes and students' interests positively impact learning outputs, but intrinsic motivation has an even stronger effect. This suggests that while creating an engaging classroom and sparking interest are important, helping students stay self-motivated is key. Giving them choices, encouraging decision-making, and showing how lessons connect to their goals can make a significant difference. However, this study only focused on teacher attitudes, student interest, and motivation but did not consider factors like socioeconomic status or school resources, which future research could explore.

In addition, the results show that domains such as instructor prompt feedback, students' expectations, emotions, value-related valences, goals, tasks, and efforts were predictors of students' learning outputs. These factors should be addressed in educational settings. The data support that a holistic approach targeting these characteristics can substantially enhance student engagement and achievement.

This study's findings emphasize the importance of creating positive classroom environments and offering personalized learning experiences that align with students' interests and intrinsic motivation in the Philippines and ASEAN. Educational policies should prioritize teacher professional development to foster engaging, supportive learning environments. Curricula should promote autonomy, self-regulation, and emotional connections to learning. Globally, these findings align with ASEAN's focus on motivation and emotional engagement as key drivers of success. Teacher training should be revised to include strategies for fostering intrinsic motivation, aligning lessons with students' goals, and promoting emotional and value-related connections to enhance performance.

The study concludes that teachers' positive attitudes, supportive classroom environments, and prompt feedback significantly impact student learning outputs. Students' interests, particularly those linked to emotional and value-driven connections, enhance their commitment and academic success. Intrinsic motivation, the strongest predictor of success, is crucial in fostering autonomy and self-regulation, directly influencing learning outputs.

However, the study's focus on first-year mathematics students limits broader applicability. Future research should include diverse student groups, directly measure learning outputs, and explore strategies like collaborative projects, student-led

discussions, and real-world applications to enhance motivation. Curricula should prioritize student autonomy and active participation, while institutions can design teacher training and inclusive programs. Policies should invest in tools to track intrinsic motivation and support interventions, complemented by mentorship and extracurricular activities addressing emotional and value-driven learning.

Statement and Declarations

1. Funding details.

This work received financial support from the researchers' personal finances.

2. Disclosure statement.

The authors contend that there are no conflicting interests to disclose.

3. Acknowledgement.

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4. Ethical Approval.

This is to certify that the study entitled "A MULTIVARIATE ANALYSIS OF TEACHERS ATTITUDES, STUDENTS INTERESTS, INTRINSIC MOTIVATION ON STUDENTS LEARNING OUTPUTS" with REC Protocol Code: 116-02-2024 by MEG C. ENRIQUEZ, MELODY R. ALVARADO, and MARIVEL A. APIT, students of the Teacher Education Department of Davao de Oro State College – Main Campus, has been examined by the Davao de Oro State College – Research Ethics Committee (DdOSC-REC) as EXPEDITED REVIEW with Protocol Version no. 01 and ICF Version no. 01 and has been evaluated to have adequately complied the requirements for the study ethics protocol and is, therefore, cleared for implementation using universally scientific procedures and internationally accepted ethical guidelines effective February 26, 2024, until July 25, 2024.

5. Declaration of Generative AI in Scientific Writing.

During the preparation of this work, the author(s) used AI website and quillbot to enhance text clarity and originality. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

■ ■ ■

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