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LEARNING MOTIVATION AND VALUE-EXPECTANCY ON SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS OF JUNIOR HIGH SCHOOL STUDENTS

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Abstract. This quantitative non-experimental study employed a descriptive-correlational and predictive approach to investigate the relationship between learning motivation and value expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students. A total of 150 students participated in the survey. The findings revealed that the extent of Junior High School students' learning motivation in terms of self-efficacy, active learning strategies, science learning, performance goal, achievement goal, and learning environment stimulation was extensive descriptive equivalent. Likewise, the extent to which junior high school students value expectations on science, technology, engineering, and mathematics in terms of the perceived value of these fields and expectations for success in science, technology, engineering, and mathematics careers was extensive. A significant relationship between learning motivation and value expectancy in science, technology, engineering, and mathematics among junior high school students. The statistical analysis shows a significant positive relationship between learning motivation and value expectancy in Science, Technology, Engineering, and Mathematics (STEM) among junior high school students in the Davao Oriental division. Active learning strategies and achievement goals are domains of learning motivation that do not significantly influence the value-expectancy of junior high school students' science, technology, engineering, and mathematics.

KEY WORDS

1. Learners Motivation. 2. Value-Expectancy on Science. 3. Technology.

1. Introduction

Science, Technology, Engineering, and Mathematics (STEM) education has become a critical component in developing human capital for the future. However, Filipino junior high school students have declining motivation in science and need more value-expectancy in STEM fields. The declining motivation of junior high school students towards learning Science, Technology, Engineering, and Mathematics (STEM) has been a growing concern for educators and policymakers. It has been evident that as students progress through their academic years, their interest in STEM subjects declines, leading to fewer students pursuing STEM-related careers. The lack of motivation among junior high school students can be attributed to several factors, such as the unavailability of hands-on activities, lack of support, and inadequate resources. This declining motivation towards STEM subjects may also affect their value expectancy towards these subjects, which can ultimately lead to lower academic achievement and career choices in STEM fields. It is essential to address this issue to ensure that students are motivated to learn and pursue STEM-related careers, which are critical for the advancement of society in the 21st century. Science educators in the early 21st century are grappling with a global issue. Students in the United States, for instance, still lag behind their peers in other nations in science achievement, particularly in European and Asian countries (Anderman, Sinatra, Gray, 2012). This issue is not confined to a single region. In the Southwest region of the United States of America, for example, when students perceived their science classwork to be more difficult than usual, they experienced decreased perceived competence, which was associated with increased disengagement (Patall, 2018). Even in Morocco, students are encountering difficulties in their science classes, considering that science subject is a complex area, curriculum overload, lack of concentration during the course, and lack of motivation (Sokrat, Tamani, Moutaabbid, Radid, 2014). This global trend underscores the urgency of addressing the declining motivation of junior high school students in STEM education. Sison (2022) stated that the Philippines, despite the government's numerous attempts to improve its educational outcomes, has instead become an educational laggard, taking the ignominious distinction of getting low rankings in three different global evaluations that scored students' performance in science, technology, engineering, and mathematics (STEM). In the same perspective, science education in the Philippines is likewise ailing (Sadera, Torres, Rogayan, 2020). Orleans (2007), as referenced by Guiamalon Hariraya (2021), revealed that the country's existing state of science education, mainly at the basic education level, lags behind other countries. With this, there are many constraints facing science education in Philippine schools that account for the low performance of Filipino students (Rabino, 2014). A Davao de Oro Division study discussed that junior high school students only generally excel in science subjects. Over time, their performance in solving science problems and learning tasks has deteriorated (Rebucas Dales, 2022). In Davao City National High School, students encountered difficulty and poor achievement in science. In connection with it, it was also observed that students' summative tests and quarterly exams are mostly skewed to average and poor scores despite the varied strategies given (Bogo Aperocho, 2023). In Cateel, Davao Oriental, the science academic performance of students is below the passing rate, which means it did not meet expectations wherein there is a manifestation of low achievement in science and perform poorly as they obtain below average following the grading scale (Delmoro, 2022). There is a significant research gap in exploring the relationship between Filipino Junior High School Students' perceptions of their science learning classes and their value-expectancy on Science, Technology, Engineering, and Mathematics (STEM) careers in public schools. Despite the growing importance of STEM education in the Philippines, there needs to be more research on how Junior High School Students perceive their science classes and how these perceptions relate to their value-expectancy on STEM careers. Additionally, there needs to be more research investigating the factors contributing to the positive or negative perceptions of science classes and the value-expectancy of Junior High School Students toward STEM careers. Addressing these research gaps can better understand the factors influencing junior high school students' engagement in STEM and improve the effectiveness of STEM education programs in public schools. The study on junior high school students' perceptions of science learning classes and value-expectancy on Science, Technology, Engineering, and Mathematics (STEM) is an

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essential research topic that requires immediate attention. Science, technology, engineering, and mathematics are crucial subjects that can open many doors for students regarding career opportunities and personal growth. However, studies have shown that students' interest and engagement in STEM subjects are decreasing, and this trend needs to be reversed. By investigating the students' perceptions of science learning classes and their value-expectancy towards STEM, this study can identify the factors contributing to the decline in interest and engagement, which can help educators and policymakers design effective strategies to increase students' interest and engagement in STEM. Furthermore, this study's novelty lies in using predictive analysis to determine the factors influencing students' perceptions and value-expectancy towards STEM. Predictive analysis is a valuable tool that can provide insights into the relationship between variables, allowing researchers to identify significant predictors and develop models to predict outcomes. By using predictive analysis, this study can provide a comprehensive understanding of the factors contributing to students' perceptions and value-expectancy towards STEM, which can inform the development of evidence-based interventions. Therefore, this study's rationale, urgency, and novelty highlight the importance of investigating the students' perceptions of science learning classes and value-expectancy towards STEM to improve their interest and engagement in STEM subjects.

2. Methodology

Presented in this chapter are the methods and procedures that was used by the researcher in conducting the study. The contents of this chapter are the research design, research respondents, research locale, research instrument, ethical considerations, data gathering procedure, and data analysis.

2.1. Research Design—The present study adopted a quantitative non-experimental research design utilizing descriptive correlation with regression analysis. The quantitative research method involves collecting and analyzing numerical data (Skinner, 2020). One of the common types of quantitative research is a non-experimental study that does not involve any manipulation of the variable, particularly the independent variable. This type of research encompasses various studies, including descriptive and correlational studies (Khaldi, 2017). A quantitative correlational design is appropriate for a study that aims to investigate the relationship between junior high school students' learning motivation and value expectancy on science, technology, engineering, and mathematics (STEM) because this design allows for the examination of the strength and direction of the relationship between two or more variables. The study intends to measure two main variables: learning motivation and their value expectancy in STEM. Using a quantitative correlational design, the researcher can determine the extent to which these variables are related and the nature of this relationship, whether it was a positive or negative correlation. This design also enables the researcher to identify the strength of the relationship between the two variables, providing insight into the significance of the findings. Additionally, a quantitative correlational design can provide a basis for making predictions about the relationships between these variables in a broader population, which can inform educational policies and practices.

2.2. Research Respondents—The researcher used a random sampling technique to identify this study's respondents. Random

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sampling was a part of the sampling technique in which each sample has an equal probability of being chosen (Meng, 2013). The following are the inclusion and exclusion criteria that the researcher observed: male or female, junior high school student from one of the public learning institutions in the Division of Davao Oriental, the school where the student is enrolled should be recognized by the Department of Education, and willing to give his or her consent for this study. A total of 300 students will be catered to during the study. A total of 150 students were catered to during this study. In research, 100 is already considered the minimum sample size when the population is identified as significant (Alshibly,2018). Choosing junior high school students as respondents in a study that focuses on the relationship between their learning motivation and value expectancy on STEM is appropriate for several reasons. Firstly, junior high school students are at a crucial stage of their academic and personal development, where they begin to form their attitudes and perceptions about various subjects, including science, technology, engineering, and mathematics. Understanding their learning motivation and value expectancy on STEM subjects could help educators and policymakers develop strategies that enhance students' interest and engagement in these fields, which can have significant long-term benefits for their academic and career trajectories. Additionally, junior high school students were a relatively understudied population in STEM education research; thus, this study can contribute to the existing body of knowledge on this topic.

2.3. Research Instrument—The instrument for the study was a survey questionnaire that was adapted and modified to meet the research objectives and the study population. Using a survey questionnaire was appropriate for this study because it enables the researcher to collect essential data relatively briefly. In addition, by adapting and modifying the survey questionnaire, the researcher could tailor the queries to be more pertinent and specific to the research objectives and population under study. Experts in the field of education would validate the questionnaire utilized for this study. It would then be pilot-tested to determine its validity and reliability. In this study's survey, a 5-point Likert scale was utilized. A Likert Scale was a commonly used measurement instrument in the social sciences, particularly in educational research, to assess individuals' attitudes, opinions, and perceptions regarding a particular topic. It enables respondents to articulate their level of agreement or disagreement with a statement on a scale ranging from strongly agree to strongly disagree. In this study, using a 5-point Likert Scale is appropriate because it provides a range of responses that can capture nuances in respondents' opinions or perceptions. Responses can be tabulated and statistically analyzed, making data analysis straightforward. Using a standardized scale, such as the 5-point Likert Scale, improves the reliability and validity of the collected data because it permits comparisons across studies. For the independent variable, which is the learning motivation of junior high school students toward their science classes, a modified and adapted Students' Motivation Towards Science Learning questionnaire from the study of Tuan, Chin, and Shieh was used. The questionnaire consists of 35 items. The science learning motivation questionnaire aims to gather information about the level of motivation of junior high school students toward science subjects. The data collected from the questionnaire could help educators and the researcher identify the factors that influence student motivation and develop strategies to improve it. By understanding the factors that affect student motivation, educators can create a more engaging and effective learning environment for students. The Likert Scale below was used to assess the learning motivation of junior high school students.

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Range	Descriptive Equivalent	Descriptive Interpretation
4.20 – 5.00	Very Extensive	Students' learning motivation is always manifested.
3.40 – 4.19	Extensive	Students' learning motivation is oftentimes manifested.
2.60 – 3.39	Moderately Extensive	Students' learning motivation is sometimes manifested.
1.80 – 2.59	Less Extensive	Students' learning motivation is seldom manifested.
1.00 – 1.79	Not Extensive	Students' learning motivation is never manifested.

For the dependent variable, value-expectancy on STEM, a modified and adapted Value-Expectancy STEM Assessment Scale questionnaire was used from the study of Appianing and Van Eck (2018). The questionnaire consists of 15 items. The Value-Expectancy STEM Assessment Scale questionnaire aims to assess the students' perceived value and expectation towards STEM subjects and how these beliefs influence their motivation and engagement in learning. Ultimately, the questionnaire aims to provide valuable insights into improving the teaching and learning of STEM subjects in junior high school. The Likert Scale below was used to assess the value-expectancy of junior high school students.

Range	Descriptive Equivalent	Descriptive Interpretation
4.20 – 5.00	Very Extensive	Students' value-expectancy on STEM is always manifested
3.40 – 4.19	Extensive	Students' value-expectancy on STEM is oftentimes manifested
2.60 – 3.39	Moderately Extensive	Students' value-expectancy on STEM is sometimes manifested
1.80 – 2.59	Less Extensive	Students' value-expectancy on STEM is seldom manifested
1.00 – 1.79	Not Extensive	Students' value-expectancy on STEM is not manifested

2.4. Data Gathering Procedure—These were the following steps that the researcher took and executed in the pre and post-conduct of the study. Adapting, Modifying, Validation, and Pilot Testing the Survey Questionnaire. The researcher began by reviewing existing literature and research studies related to the topic to adapt and modify a survey questionnaire appropriate for the study. After adapting the survey, the researcher conducted a validation process by sending the crafted questionnaire to three education experts to ensure that the questions accurately measured the studied constructs. A pilot test was conducted with a small sample of respondents to identify any problems or issues with the survey and to refine the questions ac-

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cordingly. The researcher performed this from April 24 to April 30, 2023. Asking for Permission to Conduct the Study. Before conducting the study, the researcher sought permission from the relevant authorities, including the Dean of the Graduate School at the college where the researcher is studying and the Superintendent of the Department of Education-Division of Davao Oriental. A detailed description of the study was provided, and the cooperation and support of these authorities were sought to contribute to the success of the research. The researcher performed this from May 1 to May 6, 2023. Administration and Retrieval of Informed Consent and Assent, Administration and Retrieval of Survey Questionnaire. Before administering the survey, the researcher provided respondents with a detailed explanation of the study, including the purpose, procedures, risks, and benefits, and obtain informed consent from adult respondents and assent from minors. Respondents were allowed to withdraw from the study without penalty. After obtaining consent, the survey questionnaire was administered to respondents, either online or in person, and all responses were kept confidential and anonymous. The researcher performed this from May 8 to May 13, 2023. Gathering and Tabulation of Data. After collecting all the surveys, the researcher commenced gathering and tabulating the data. The responses were checked for completeness and accuracy and then entered into a database or statistical software for analysis. Appropriate statistical methods were used to analyze the data and test the hypotheses. The researcher performed this from May 15 to May 20, 2023. Drawing Conclusions and Recommendations. Finally, the researcher established conclusions based on the results of the analysis and created recommendations for future research and practice. The data supported the conclusions and recommendations and are aligned with the research objectives. The study's limitations were considered, and areas for further investigation were suggested.

2.5. Data Analysis—These are the following statistical tools and techniques that were used by the researcher in analyzing the data. Mean. The arithmetic mean is the simple average or sum of a series of numbers divided by the count of that series of numbers (Chen, 2021). This tool was used to answer this study's first and second questions. Pearson Product-Moment Correlation Coefficient. Kenton (2022) discussed that the Pearson coefficient is a type of correlation coefficient representing the relationship between two variables measured on the same interval or ratio scale. Furthermore, he added that this tool would measure the strength of the association between two continuous variables. This tool was used to answer the third question of this study. Linear Regression. Linear regression establishes the linear relationship between two variables based on a line of best fit (Beers, 2023). This tool was used in answering the fourth question of this study.

3. Results and Discussion

This chapter presents the researcher's analyses and interpretations of the data gathered. Discussions are presented categorically based on the sequence of the problem statement in the first chapter.

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Summary of the Extent of Learning Motivation of Junior High School Students

Table 1 shows the extent of junior high school students' learning motivation from the perspective of various indicators such as self-efficacy, active learning strategies, science learning value, performance goal, achievement goal, and learning environment stimulation. Each indicator has a calculated mean and descriptive level, which gives an idea about the students' overall motivation towards learning.

Table 1. Summary of the Extent of Learning Motivation of Junior High School Students

No.	Learning Motivation	Mean	Descriptive Equivalent
1	Self-Efficacy	3.86	Extensive
2	Active Learning Strategies	3.73	Extensive
3	Science Learning Value	4.33	Very Extensive
4	Performance Goal	4.39	Very Extensive
5	Achievement Goal	4.37	Very Extensive
6	Learning Environment Stimulation	4.32	Very Extensive
	Overall	**4.17**	**Extensive**

The overall mean of the extent of learning motivation among junior high school students from Davao Oriental is 4.17, which corresponds to a high level of motivation. This suggests that the students have a positive attitude towards learning and are motivated to engage in various academic activities. The indicator with the highest mean score is performance goal, which has a mean of x=4.39, indicating a very high level of motivation. This suggests that students are motivated to achieve good grades and to perform well in their academic pursuits. The second highest mean score is achievement goal, with a mean of x=4.37, also indicating a very high level of motivation. This suggests that students are motivated to achieve their academic goals and to succeed in their studies. The third highest mean score is science learning value, with a mean of x=4.33, indicating a very high level of motivation. This suggests that students have a positive attitude towards science learning and see its value in their academic and future endeavors. The fourth highest mean score is learning environment stimulation, with a mean of x=4.32, also indicating a very high level of motivation. This suggests that students are motivated by a stimulating and conducive learning environment that encourages their engagement and participation. The fifth highest mean score is self-efficacy, with a mean of x=3.86, indicating a high level of motivation. This suggests that students have confidence in their abilities to succeed in their academic pursuits. The lowest mean score is active learning strategies, with a mean of x=3.73, indicating a high level of motivation. This suggests that students may need more support in developing and using effective active learning strategies to enhance their learning and academic performance. These findings suggest that junior high school students from Davao Oriental have a high level of motivation towards their academic pursuits. To further enhance their motivation, educators can provide a stimulating learning environment that

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encourages active engagement and participation, while also providing support for the development and use of effective learning strategies. Additionally, it may be beneficial to promote the value of science learning and to foster students' self-efficacy beliefs, which can positively impact their academic motivation and performance. The result of this study shows that junior high school students from Davao Oriental have a high level of learning motivation, which is consistent with the literature that highlights the importance of motivation in the learning process. According to Syefrinando et al. (2020) and Filgona et al. (2020), motivation is crucial in providing energy, direction, and maintaining positive student behavior to engage in the learning process actively. In addition, Karakolidis et al. (2019) found that motivation for learning science is a key predictor of science achievement among 15-year-old students. Thus, the high level of learning motivation among the junior high school students in this study may indicate their positive attitude toward learning and their motivation to engage in academic activities, potentially leading to better academic achievement.

Summary of the Extent of Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students

The overall mean for Value-Expectancy on Science, Technology, Engineering, and Mathematics (STEM) of Junior High School Students is 4.00 with a high descriptive level. This indicates that the students generally have a positive attitude towards STEM fields and careers, and they perceive value and expectations for success in these areas.

Table 2. Summary of the Extent of Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students

No.	Value-Expectancy on STEM	Mean	Descriptive Equivalent
1	Perceived Value of Science, Technology, Engineering, and Mathematics Fields	3.99	Extensive
2	Expectations for Success in Science, Technology, Engineering, and Mathematics Careers	4.02	Extensive
	Overall Mean	**4.00**	**Extensive**

The indicator with the highest mean is Expectations for Success in STEM Careers, with a mean of 4.02 and a high descriptive level. This suggests that the students strongly believe in their ability to succeed in STEM careers, which could lead to increased motivation and effort in pursuing these careers. The second-highest indicator is the Perceived Value of STEM Fields, with a mean of 3.99 and a high descriptive level. This indicates that the students recognize the importance and relevance of STEM fields in their lives and society, which could also contribute to their interest and motivation in pursuing STEM education and careers. From the respondents' perspective, these results suggest that efforts to promote STEM education and careers among junior high school students in Davao Oriental could be successful, as the students generally have a positive attitude towards STEM and believe in their ability to succeed in these fields.

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However, it is important to continue to provide support and resources to help students develop their skills and knowledge in STEM, and to address any barriers or challenges they may face in pursuing these fields. This result is consistent with the expectancy-value theory, which suggests that individuals who highly value and expect to be successful in STEM domains are likely to be motivated to continue taking courses and choose STEM careers (Bøe Henriksen, 2014; Andersen, 2013). Moreover, Treacy et al. (2023) stated that the value placed on engaging with mathematics at an advanced level and the expectation of success significantly impact motivation to engage with and achieve success in this field. Therefore, it can be inferred that the positive attitude and high value-expectancy of junior high school students towards STEM may contribute to their motivation to engage in STEM-related activities, pursue STEM courses and careers, and achieve success in these fields.

Significant Relationship Between Learning Motivation and Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students

Table 3 presents the statistical results for the Significant Relationship Between Learning motivation and Value-Expectancy on Science, Technology, Engineering, And Mathematics of Junior High School Students. The table provides the following information: r value, p-value, decision on HO1 at 0.05 level of significance, and interpretation. The statistical analysis shows a significant positive relationship between learning motivation and value expectancy in Science, Technology, Engineering, and Mathematics (STEM) among junior high school students in the Davao Oriental division. The r value of .709 indicates a strong positive correlation between the two variables. The p-value of 0.000 suggests that the relationship between the variables is significant, with a 0.05 level of significance. The rejection of the null hypothesis (HO1) at a 0.05 level of significance means that the relationship between learning motivation and value expectancy in STEM is not due to chance. Instead, there is likely a real relationship between these variables.

Table 3. Significant Relationship Between Learning Motivation and Value-Expectancy on Science, Technology, Engineering, And Mathematics of Junior High School Students

Value-Expectancy on Science, Technology, Engineering, and Mathematics	**r**	**p-value**	**Decision on HO1 at 0.05 level of significance**	**Interpretation**
Learning Motivation	0.709	0.000	Reject HO1	There is a significant relationship.

From the perspective of the junior high school students in the Davao Oriental division, these results have important implications. Firstly, it suggests that students who are motivated to learn STEM are more likely to have positive perceptions and expectations of the value of these fields. This finding reinforces the importance of promoting learning motivation as a

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means of encouraging students to pursue STEM careers. Additionally, these results highlight the need for educators to focus on enhancing the value-expectancy of STEM fields among junior high school students. By promoting the value and potential for success in STEM careers, educators can further motivate students to engage in STEM learning and pursue these fields in the future. This result is consistent with the findings of previous research that highlights the importance of expectancy-value theory (EVT) in understanding students' motivation and engagement in STEM fields. EVT suggests that when children value mathematics or science and expect to be successful in those domains, they are more likely to be motivated to continue taking courses and to choose STEM careers (Andersen, 2013). Furthermore, a recent study explored student engagement with advanced mathematics study using EVT as a framework and found that motivation to engage with, persist with, and achieve success within advanced mathematics are commonly impacted by the expectation of success and the value placed on engaging with mathematics at this level (Treacy, O'Meara, Prendergast, 2023). This study reinforces the idea that students' perception of the value and expectations of success in STEM fields can impact their motivation to engage in STEM activities. In addition, another study used EVT as a framework to hypothesize the path model and found that student attitudes (expectancy-value beliefs) and their career interests are positively associated (Han, Kelley, Knowles, 2021). This finding implies that students' expectancy-value beliefs can influence their long-term career interests in STEM fields. Overall, our study supports the EVT framework and the previous research that highlight the importance of value-expectancy on STEM and its positive correlation with learners' motivation.

The domain of Learning Motivation that Significantly Influences the Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students

Table 4 presents a linear regression analysis that examines the relationship between learning motivation and value-expectancy on STEM fields among junior high school students in the Davao Oriental division. The table features two domains of learning motivation that significantly influence value-expectancy, namely active learning strategies and achievement goals. The table presents unstandardized coefficients (B) and standard errors, as well as standardized coefficients (Beta), T-values, and significance levels for each indicator. Additionally, the table highlights the decision on HO2 and its interpretation. Finally, the table also includes key statistics such as the R-value, R2, F-value, and P-value.

Active Learning Strategies and Science Learning Value Do not Influence the Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students since the 0.73 and 0.063 are both greater than p value of 0.00. Statistically, the null hypothesis is rejected. This means that the two indicators believe that they do meet the needs of the respondents as they rated not significant. The overall model shows a strong positive relationship between learning motivation and value-expectancy on Science, Technology, Engineering, and Mathematics (STEM) of Junior High School Students. The R-value of .859 indicates a strong correlation between the two variables. This implies that as learning motivation towards STEM increases, their value-expectancy towards STEM also increases. The R-squared value of .730 shows that the model explains 73 percent of the variance in value-expectancy towards STEM, indicating a good fit for the data. The F-value of 66.902

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Table 4. Domain of Learning Motivation that Significantly Influences the Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students

	Value-Expectancy on STEM	Unstandardized Coefficients				
		B	**Std. Error**	**Beta**	**T**	**Sig.**
Constant	-0.002	0.399	-0.004	0.996		
Self-Efficacy		0.658	0.087	0.598	7.558	0.000
Active Learning Strategies		-0.106	0.059	-0.100	-1.806	0.073
Science Learning Value		1.060	0.565	0.747	1.875	0.063
Performance Goal		0.418	0.112	0.285	3.721	0.000
Achievement Goal		-2.507	0.795	-1.604	-3.152	0.002
Learning Environment Stimulation		1.482	0.366	0.913	4.050	0.000

R = 0.859; R^2 = 0.737, F-value = 66.902; p-value = 0.000

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with a p-value of 0.000 indicates that the overall model is statistically significant, and the null hypothesis can be rejected, suggesting that there is a relationship between learning motivation and value-expectancy towards STEM among Junior High School Students from the Davao Oriental division. The comprehensive findings from the regression analysis reveal significant implications for promoting learners' motivation and value-expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students. The results highlight the influential role of several key indicators of motivation, namely self-efficacy, performance goal, achievement goal, and learning environment stimulation. The significant positive association between self-efficacy and value-expectancy emphasizes the importance of instilling confidence and belief in students' abilities to succeed in STEM disciplines. By nurturing self-efficacy through targeted interventions and supportive learning environments, educators can enhance students' motivation and their expectations of success in STEM subjects. In addition, the significant positive relationship between performance goal and value-expectancy highlights the value of setting specific, challenging goals that are tied to academic achievement in STEM. Encouraging students to strive for excellence and providing them with clear performance benchmarks can increase their motivation and enhance their perceived value of STEM education. Moreover, the negative association between achievement goal and value-expectancy suggests that students who primarily focus on outperforming others or avoiding failure may have lower expectations of the value of STEM subjects. It is crucial to cultivate a growth mindset and promote mastery-oriented goals that emphasize personal improvement and learning rather than solely comparing oneself to others. This can foster a more positive attitude towards STEM education and increase students' value-expectancy. Furthermore, the significant positive relationship between learning environment stimulation and value-expectancy underscores the importance of creating engaging and stimulating learning environments. Providing hands-on experiences, real-world connections, and opportunities for collaborative and inquiry-based learning can enhance students' motivation and their perception of the value and relevance of STEM subjects. Taken together, these findings suggest that a comprehensive approach to promoting learners' motivation and value-expectancy in STEM education involves nurturing self-efficacy beliefs, setting performance and mastery-oriented goals, cultivating engaging learning environments, and fostering a growth mindset. By addressing these multifaceted motivational factors, educators and policymakers can effectively enhance students' motivation, engagement, and aspirations in STEM fields, ultimately preparing them for future success in science, technology, engineering, and mathematics. The result of a strong positive relationship between learning motivation and value-expectancy on STEM of junior high school students is consistent with the expectancy-value theory (EVT) framework. EVT posits that students' values, which can be influenced by their experiences, sociodemographic, and disciplinary norms, shape their likelihood of putting effort into learning (Wheeler et al., 2023). Additionally, the findings emphasize the need to promote achievement goals that focus on mastery, improvement, and personal growth rather than solely on performance outcomes. Encouraging a growth mindset and providing opportunities for students to set and achieve realistic goals can enhance their belief in their own capabilities and increase their value-expectancy in STEM subjects. Policymakers and curriculum designers can support these findings by providing professional development opportunities for teachers to learn and implement effective active learning strategies and by promoting a balanced approach to assessment and evaluation that val-

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ues students' effort, progress, and growth. Overall, these findings emphasize the importance of creating a supportive and engaging learning environment that nurtures students' motivation, fosters their value-expectancy in STEM, and ultimately promotes their long-term interest and success in these fields.

The study by Han et al. (2021) explored how multiple factors affect students in the context of integrated STEM learning and found that student STEM attitudes, including self-efficacy and expectancy-value beliefs, are positively associated with STEM knowledge achievement. These findings indicate that when learners highly value STEM fields and expect success in these domains, they are likely to be motivated to continue taking STEM courses and choose STEM careers (Andersen, 2013). The strong positive relationship between motivation and value-expectancy towards STEM, as shown by the high R-value of .859, implies that as learners' motivation towards STEM increases, their value-expectancy towards STEM also increases. This finding is consistent with the notion that motivation to engage with, persist with, and achieve success within STEM fields are commonly impacted by the expectation of success and the value placed on engaging with STEM at this level (Treacy, O'Meara, Prendergast, 2023). The high R-squared value of .730 also indicates that the model explains 73While there is limited information on the relationship between active learning strategies and achievement goal influences on the value-expectancy of students on STEM, the use of EVT in this study proved to be a useful framework to understand the relationship between motivation, value-expectancy, and student outcomes in STEM learning (Han et al., 2021). Overall, the findings of the study suggest that educators and policymakers can improve student outcomes in STEM learning by fostering students' motivation and value-expectancy towards STEM fields and careers.

4. Conclusions and Recommendations

This chapter presents the summary of the findings, the conclusions based on the findings, and the recommendations generated from the findings and conclusions.

4.1. Findings—The study was conducted to determine whether there was a significant relationship between learning motivation and value expectations for junior high school students in science, technology, engineering, and mathematics. To find the answers, the researcher surveyed junior high school students in selected schools in the Division of Davao Oriental. The researcher employed a descriptive correlation method of research using an adapted questionnaire as the research instrument for gathering the data. The statistical tools used in interpreting and analyzing the data were Mean, Pearson Product Moment Correlation Coefficient or Pearson r, and Linear Regression. The study also identified the extent of junior high school students' learning motivation when analyzed in terms of self-efficacy 3.86 with extensive descriptive equivalent, active learning strategies 3.73 with extensive descriptive equivalent, science learning value 4.33 with very extensive descriptive equivalent, performance goal, achievement goal 4.37 with very extensive descriptive equivalent, and learning environment stimulation 4.32 with very extensive equivalent. The overall mean of the extent of learning motivation of Junior High School 4.17 with the extensive descriptive equivalent. The Extent of Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students in terms of Perceived Value of Science, Technology, Engineer-

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ing, and Mathematics Fields 3.99 with extensive descriptive equivalent, and Expectations for Success in Science, Technology, Engineering, and Mathematics Careers 4.02 with extensive descriptive equivalent. The overall mean of Extent of Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students is 4.00 with extensive descriptive equivalent. Moreover, the extent of junior high school students' value expectations on science, technology, engineering, and mathematics in terms of the perceived value of these fields and expectations for success in science, technology, engineering, and mathematics careers, was also identified. This study sought to find the relationship between learning motivation and value-expectancy in science, technology, engineering, and mathematics in addition to its main objective of finding this relationship. The statistical analysis shows a significant positive relationship between learning motivation and value expectancy in Science, Technology, Engineering, and Mathematics (STEM) among junior high school students in the Davao Oriental division. The r value of .709 indicates a strong positive correlation between the two variables. The p-value of 0.000 suggests that the relationship between the variables is significant, with a 0.05 significance level. The rejection of the null hypothesis (HO1) at a 0.05 significance level means that the relationship between learning motivation and value expectancy in STEM is not due to chance. Instead, there is likely a real relationship between these variables. The overall model shows a strong positive relationship between learning motivation and value-expectancy on Science, Technology, Engineering, and Mathematics (STEM) of Junior High School Students. The R-value of .859 indicates a strong correlation between the two variables. This implies that as learning motivation towards STEM increases, their value-expectancy towards STEM also increases. The R-squared value of .730 shows that the model explains 73 percent of the variance in value-expectancy towards STEM, indicating a good fit for the data. However, the two indicators, Active Learning Strategies and Science Learning Value, Do not Influence the Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students since the 0.73 and 0.063 are both greater than the p-value of 0.00. Statistically, the null hypothesis is rejected. This means that the two indicators believe that they do meet the needs of the respondents as they rated not significant. Active learning strategies and achievement goals are domains of learning motivation that do not significantly influence the value-expectancy of junior high school students' science, technology, engineering, and mathematics. The overall model shows a strong positive relationship between learning motivation and value-expectancy on Science, Technology, Engineering, and Mathematics (STEM) of Junior High School Students. The R-value of .859 indicates a strong correlation between the two variables. This implies that as learning motivation towards STEM increases, their value-expectancy towards STEM also increases. The R-squared value of .730 shows that the model explains 73 percent of the variance in value-expectancy towards STEM, indicating a good fit for the data. However , the two indicators, Active Learning Strategies and Science Learning Value, Do not Influence the Value-Expectancy on Science, Technology, Engineering, and Mathematics of Junior High School Students since the 0.73 and 0.063 are both greater than the p-value of 0.00. Statistically, the null hypothesis is rejected. This means that the two indicators believe that they do meet the needs of the respondents as they rated not significant. This implies that they are more likely to actively engage in STEM-related activities, pursue STEM courses, and consider future careers in STEM. To capitalize on this high value-expectancy, educators could design and imple-

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ment engaging STEM curricula that highlight the real-world relevance and applications of STEM subjects, provide opportunities for hands-on experimentation, and showcase the diverse career pathways available in STEM fields. Policymakers can support initiatives that promote STEM education, provide resources for STEM enrichment programs, and foster partnerships with industry and research institutions to expose students to real-world STEM experiences. Additionally, parents and guardians can play a crucial role by encouraging their children's interest in STEM, exposing them to STEM-related activities outside of school, and providing guidance and support in exploring STEM opportunities. By nurturing and harnessing the high extent of value-expectancy on STEM among junior high school students, stakeholders can cultivate a strong STEM talent pool, drive innovation, and contribute to developing a scientifically and technologically advanced society. The finding that active learning strategies and achievement goals significantly influence the value-expectancy of junior high school students in science, technology, engineering, and mathematics (STEM) holds important implications for educators, policymakers, and curriculum designers. It highlights the importance of implementing active learning strategies that promote student engagement, such as problem-solving activities, group discussions, and hands-on experiments, as they contribute to students' perception of the value and expectations in STEM subjects. By incorporating these strategies into the curriculum, educators can enhance students' learning experiences, foster their intrinsic motivation, and increase their interest and confidence in STEM fields.

4.2. Conclusions—Given the findings of the study presented, the following were the conclusions to wit; The extent of Learning Motivation of Junior High School students in terms of self-efficacy, active learning strategies, science learning, performance goal, achievement goal, and learning environment stimulation was extensive descriptive equivalent. The extent to which junior high school students value expectations on science, technology, engineering, and mathematics in terms of the perceived value of these fields and expectations for success in science, technology, engineering, and mathematics careers was extensive.

There was a significant relationship between learning motivation and value expectancy in science, technology, engineering, and mathematics among junior high school students. The statistical analysis shows a significant positive relationship between learning motivation and value expectancy in Science, Technology, Engineering, and Mathematics (STEM) among junior high school students in the Davao Oriental division. Active learning strategies and achievement goals are domains of learning motivation that do not significantly influence the value-expectancy of junior high school students' science, technology, engineering, and mathematics. The finding of a significant relationship between learning motivation and value expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students carries important implications for educators, policymakers, and parents/guardians. This indicates that students who exhibit higher levels of learning motivation are more likely to have positive expectations and value toward STEM subjects and careers. It suggests that fostering and enhancing students' learning motivation can positively influence their perception of the value and importance of STEM, leading to increased engagement, active participation, and improved academic performance in these disciplines.

4.3. Recommendations—Based on the findings and conclusions, the following recommendations are put forward to those concerned: Department of Education Policymakers. Based on the findings indicating a high extent of learning motivation and value-expectancy in science, technology, engineering, and mathemat-

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ics (STEM) among junior high school students, focusing on enhancing the STEM learning experience may be recommended. Policymakers may prioritize integrating active learning strategies that promote student engagement into the curriculum, such as problem-solving activities, hands-on experiments, and collaborative learning. This could be achieved by providing professional development opportunities for teachers to acquire the necessary skills and knowledge to implement effective active learning strategies. Policymakers could support initiatives that promote STEM education, provide resources for STEM enrichment programs, and foster partnerships with industry and research institutions to expose students to real-world STEM experiences. Additionally, parents and guardians may play a crucial role by encouraging their children's interest in STEM, exposing them to STEM-related activities outside of school, and providing guidance and support in exploring STEM opportunities. By nurturing and harnessing the high extent of value-expectancy on STEM among junior high school students, stakeholders can cultivate a strong STEM talent pool, drive innovation, and contribute to developing a scientifically and technologically advanced society. Moreover, policymakers may prioritize developing and implementing supportive policies and initiatives that foster a positive learning environment, encourage student engagement, and recognize the importance of intrinsic motivation in academic success. By capitalizing on the high extent of learning motivation among junior high school students, educators and policymakers can foster a culture of continuous learning, promote academic achievement, and support students in their educational journey. Additionally, it was crucial to emphasize achievement goals that foster a growth mindset and focus on mastery, improvement, and personal growth rather than solely on performance outcomes. Policymakers should ensure that assessment and evaluation practices align with these goals, valuing students' effort, progress, and growth. By creating a supportive and engaging learning environment that nurtures students' motivation and value expectancy in STEM, policymakers can cultivate a generation of enthusiastic, competent, and prepared students for future STEM-related challenges and opportunities. Public and Private School Administrators. Based on the findings indicating a high extent of learning motivation and value-expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students, it may recommend that public and private school administrators prioritize the implementation of strategies that foster a supportive and engaging learning environment for STEM education. Administrators should encourage and support teachers in incorporating active learning strategies into their instructional practices, such as project-based learning, inquiry-based learning, and collaborative group work. They should also provide resources and professional development opportunities for teachers to enhance their pedagogical skills and content knowledge in STEM disciplines. Additionally, administrators may establish partnerships with local industries, research institutions, and STEM-related organizations to provide students with real-world connections and opportunities for hands-on experiences. By creating a stimulating and inclusive learning environment that nurtures students' motivation and value expectancy in STEM, school administrators can foster a passion for STEM disciplines, promote higher levels of student engagement, and prepare students for future STEM careers and challenges. Public and Private Science Teachers. Based on the findings indicating a significant relationship between learning motivation and value expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students, it is recommended that public and private science teachers focus on designing instructional strategies that enhance students'

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motivation and cultivate their value-expectancy in STEM subjects. Teachers should incorporate active learning techniques, such as hands-on experiments, problem-solving activities, and interactive discussions, to actively engage students in learning. They should create a positive and inclusive classroom environment where students feel valued and supported in their STEM pursuits. Teachers may design instructional strategies that promote intrinsic motivation, provide meaningful and relevant learning experiences, and emphasize the real-world applications of STEM concepts. Policymakers can support initiatives that promote a positive STEM learning environment, provide resources for teacher professional development in motivation-enhancing strategies, and invest in extracurricular STEM activities that spark students' interest and curiosity. Parents and guardians can play a supportive role by encouraging their children's intrinsic motivation, providing opportunities for hands-on STEM experiences, and fostering a positive attitude towards STEM learning. By recognizing and nurturing the significant relationship between learning motivation and value expectancy in STEM, stakeholders can create an environment that fosters a love for STEM, inspires lifelong learners, and cultivates a future generation equipped with the knowledge and skills to thrive in STEM fields.

Additionally, teachers should emphasize the real-world relevance and applications of STEM concepts to foster students' understanding of the practical value of STEM disciplines. By promoting intrinsic motivation and highlighting the utility value of STEM, teachers can inspire students' curiosity, promote deeper engagement, and foster a lifelong passion for science and mathematics. Continuous professional development opportunities and collaboration with colleagues can also enhance teachers' pedagogical skills and knowledge of effective instructional strategies. Parents and Guardians. Based on the findings indicating a high extent of learning motivation among junior high school students, it is recommended that parents and guardians actively support and encourage their children's motivation toward learning. Parents can create a conducive home environment that promotes curiosity, exploration, and self-directed learning. They can converse with their children about the importance and relevance of education, particularly in science, technology, engineering, and mathematics (STEM) fields. Encouraging their children to pursue their interests in STEM and providing resources, such as books, educational materials, and access to online resources, can further enhance their motivation. Parents should also foster a positive attitude towards learning by celebrating their children's achievements and providing constructive feedback. By being actively involved in their children's education and nurturing a supportive and encouraging atmosphere, parents and guardians can contribute significantly to their children's overall motivation, academic success, and long-term engagement in STEM disciplines. Public and Private Junior High School Students. Based on the findings that indicate a high extent of learning motivation and value-expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students, it is recommended that students actively engage in and explore STEM-related activities. Public and private junior high school students should take advantage of STEM clubs, competitions, and workshops to further develop their interests and skills in these fields. They should also seek mentors or professionals in STEM careers to gain valuable insights and guidance. Additionally, students should actively participate in class discussions, ask questions, and collaborate with their peers to enhance their learning experience. It is important for students to set realistic goals, maintain a positive mindset, and persevere in the face of challenges. By actively pursuing STEM activities and embracing a growth mindset, junior high school students can enhance

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their academic performance and develop the necessary skills and passion for future success in STEM-related fields. Future Researchers. Based on the findings indicating a high extent of learning motivation and value-expectancy in science, technology, engineering, and mathematics (STEM) among junior high school students, it is recommended that future researchers further explore the factors influencing and promoting motivation and value-expectancy in STEM education. Conducting in-depth qualitative studies could provide valuable insights into the specific strategies, teaching methodologies, and interventions that effectively enhance students' motivation and value expectancy in STEM subjects. Future researchers should also investigate the long-term effects of sustained motivation and value expectancy on students' academic achievement, career choices, and overall engagement in STEM fields. Additionally, examining the impact of cultural, societal, and environmental factors on students' motivation and value expectancy could contribute to developing more inclusive and effective STEM education practices. By expanding the knowledge base on motivation and value expectancy in STEM learning, future researchers can inform educational policies and practices to foster a strong foundation for student's future success in STEM disciplines.

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