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THE INFLUENCE OF LEARNING ENVIRONMENT AND MATHEMATICS MOTIVATION TOWARDS STUDENTS' ATTITUDES OF MATHEMATICS EDUCATION STUDENTS

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ABSTRACT

The purpose of the study was to determine the influence of learning environment and mathematics motivation towards student's attitude of mathematics education students. The study is quantitative research that utilizes descriptive-correlational approach. A sample of 150 randomly selected mathematics major students that was identified using stratified random sampling answered the surveys on the three variables. Results showed that the level of learning environment, mathematics motivation, and students' attitude are all high in level. Results also revealed that there is significant relationship between learning environment and students' attitude Likewise, there was also a significant relationship between mathematics motivation and attitude of the students. Moreover, results showed that domains of learning environment, which are the classroom involvement and personal relevance can significantly influence students' attitude towards mathematics. Finally, it was revealed that domains of mathematics motivation, which are the intrinsic value, attainment value, and self-regulation can significantly have influenced the attitudes of the respondents. Results implied that the variables are significant in improving the attitudes of mathematics major students.

KEYWORDS: *Learning Environment, Mathematics Motivation, Students' Attitudes, Mathematics Major Students, Descriptive-Correlational Approach*

INTRODUCTION

Attitudes are among the subjective elements that can be developed and gained from the experiences a student encounters in various situations. They are among the most significant emotional elements that the curricula aim to nurture in students. It influences their motivation to learn and encourages their wish to master the learning material. The significance of assessing attitudes towards mathematics is to recognize students' views and work on changing, nurturing, refining, and boosting negative ones, as cultivating positive attitudes towards (Puspitarini & Hanif, 2019).

In Indonesia, In the PISA assessment of mathematical literacy, Indonesia holds the 72nd position out of 78 countries, achieving an average score of 379 compared to an international average of 487, which categorizes them at level one, lower than the top level, level six. These surveys show that the level of mathematical literacy in Indonesia is still poor. Contributing factors to this involve students' diminished self-esteem, unfavorable perceptions of mathematics, and restricted problem-solving abilities, all of which are strongly linked to critical thinking skills (Schliecher, 2019).

In the Philippines, the studies about college students found out that students still favor the learning method in which the instructor clarifies the lessons, followed by an evaluation. They found Students in the online mode of instruction experienced a notable decline in their motivation and self-efficacy in mathematics while continuing to exhibit high levels of anxiety which leads in negative attitude especially in mathematics (Guansi et al., 2020).

This study holds immense significance across various levels. It can empower individual students by helping them develop a positive attitude in math and improve their mental well-being. At the educational level, it can guide teachers and institutions in adopting more effective teaching strategies and curriculum designs. Furthermore, on a societal scale, it can contribute to economic growth, promote educational equity, and address the growing mental health crisis among students, all of which are crucial in the ever-evolving landscape of education. The urgency to undertake this research is paramount, given the pressing need to support students' emotional well-being, adapt to changing educational paradigms, and secure a competitive future for societies.

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In the context of this research, there is a remarkable absence of studies exploring the influence of learning environment and mathematics motivation towards students' attitude in math within a local setting. Although some related research exists, such as Mazana et. al (2019) study titled "Investigating Students' Attitude Towards Learning Mathematics," and Pasco, (2021) study titled "Self-Concept, Peer Pressure, and Teaching Strategies, and Their Influence on Students' Performance in Mathematics: A Cross-Sectional Study," these studies primarily examine the impacts of self-perception, student and teaching strategies on mathematical performance separately. This research intends to bridge this discrepancy by analyzing the interconnected influences of learning environment and mathematics motivation regarding students' perspective on mathematics. It is essential to note that this study is specifically conducted in the Philippines, focusing on college students studying mathematics in the region of Davao del Norte.

The findings would be extensively disseminated to the general public via hard and soft copies. Future researchers would be reached by academic conferences and publications, but students will be the target audience for instructional materials and interactive presentations. Institutions will be aware and involved if they were collaborating and participate in pertinent forums. With this strategy, we hope to make the research meaningful and approachable to a wide range of audiences.

Research Questions

1. To determine the level of learning environment in terms of:
   - 1.1 Teacher Support;
   - 1.2 Classroom Involvement; and
   - 1.3 Personal Relevance
2. To determine the level of Mathematics motivation in terms of:
   - 2.1 Intrinsic value;
   - 2.2 Attainment value; and
   - 2.3 Self-regulation
3. To determine the level of student's attitudes towards mathematics in terms of:
   - 3.1 Mathematics academic self-concept;
   - 3.2 Enjoyment of mathematics; and
   - 3.3 Perceived value of mathematics.
4. Is there a significant relationship between:
   - 4.1 Learning environment and students' attitude towards mathematics; and
   - 4.2 Mathematics motivation and students' attitude towards mathematics.
5. To determine which domain/s of learning environment and mathematics motivation can considerably influence the student's attitude towards mathematics of Mathematics education students.

RESEARCH METHODOLOGY

Research Design

A quantitative research design was employed in this study, utilizing a descriptive-correlational technique. The primary goal was to evaluate how learning environment and mathematics motivation influence students' attitude among teacher education mathematics students. This research approach entails collecting and analyzing numerical data to scrutinize and quantify various variables, aiming to derive meaningful insights. Descriptive quantitative research aims to describe population, situation or phenomenon in a precise and systematic manner. It is capable of answering what, where, when and how questions, but it doesn't answer why. The researcher is not controlling or manipulating any of these variables but only observing them and measuring them (McCombes, 2019).

STATISTICAL TREATMENT OF DATA

The data collected from the questionnaires were processed and analyzed using various statistical tools. These tools were applied to the data to help identify patterns and relationships that could shed light on the study's objectives. The results of this analysis were then used to draw conclusions and make recommendations considering the results.

Mean. This was used to determine the level of quality of learning environment, mathematics motivation, and students' attitude among mathematics students in teacher education.

Pearson-r. This statistical tool was employed to determine the significant relationship between learning environment and on students' attitude as well as mathematics motivation and students' attitude among mathematics students in teacher education.

Regression. This was used to determine the significant influence of the learning environment and mathematics motivation on students' attitude among mathematics students in teacher education.

Participants

The study involved students enrolled in Academic Year 2023-2024 at Kapalong College of Agriculture, Sciences and Technology in the Province of Davao del Norte. Specifically, these includes teacher education mathematics students in all year level. To ensure an accurate distribution of samples, the researcher utilized stratified random sampling, specifically proportional allocation. The respondents of this study were primarily drawn using the Slovin's formula with a margin of error of 0.05. A total of 150 students out of 245 across all year level of mathematics students were the respondents of the study. They were chosen as the respondents because the study is all about the epistemological beliefs and cognitive flexibility as antecedents of problem-solving attitude, and since the study purpose involves students' perception, it would be fitting and valid to include the teacher education mathematics students.

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Data Collection

In gathering data, the researchers took the following steps.

Questionnaire Development. The researcher searched the questionnaires drawn from journal articles related to the three variables.

Revision and Validation of Questionnaires. After forming the questionnaire, it was used and submitted to a presented before an expert panel for evaluation and contextualization. The researcher follows the advice of those revision experts until it was approved for use.

Requesting Approval to Carry out the Study. The researcher asked for permission to conduct this from the vice president of academic affairs at the research locale through a formal letter. The letter was signed by the researcher himself and noted by his research adviser and the director for research and development.

Distribution and Retrieval of the Questionnaire. Survey questionnaires in printed forms were distributed individually to the respondents, who are second to fourth-year mathematics students roaming around the campus.

Collection and Tabulation of the Data. After the survey, the researcher took and analyzed the research instrument to record the collected data from the respondents. The statistical data were analyzed, and the findings were subsequently interpreted. Based on the final data set, findings were made, and suggestions were developed in accordance with the results of the learning assessment.

RESULTS AND DISCUSSION

The following are the results of the study

Table 1
Level of Learning Environment

Indicators	Mean	Description
Teacher Support	4.12	High
Classroom Involvement	3.88	High
Personal Relevance	3.96	High
OVERALL	**3.98**	**High**

Presented in Table 1 is the overall level of learning environment among mathematics education students in terms of teacher support, classroom involvement, and personal relevance. The data revealed that the level of learning environment among mathematics education students has a total mean of 3.98 with the descriptive equivalent categorized as high. This high descriptive equivalent indicates that the level of learning environment among mathematics education students is oftentimes manifested.

Table 2
Level of Mathematics Motivation

Indicators	Mean	Description
Intrinsic value	4.22	High
Attainment value	4.03	High
Self-regulation	4.14	High
OVERALL	**4.13**	**High**

Presented in Table 2 is the overall level of mathematics motivation among mathematics education students in terms of intrinsic value, attainment value, and self-regulation. The data revealed that the level of mathematics motivation among math education students has a total mean of 4.13 with the descriptive equivalent of high. This indicated that the level of mathematics motivation of students is oftentimes observed.

Table 3
Level of Students Attitude towards Mathematics

Indicators	Mean	Description
Mathematics academic self-concept	3.76	High
Enjoyment of mathematics	4.12	High
Perceived value of mathematics	4.25	High
OVERALL	**4.04**	**High**

Presented in Table 3 is the overall level of students' attitude towards mathematics among mathematics education students in terms of mathematics academic self-concept, enjoyment of mathematics, and perceived value of mathematics. The data

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revealed that the level of students' attitude towards mathematics among mathematics education students has a total mean of 4.04 with the descriptive equivalent of high. This indicated that the level of students' attitude towards mathematics among mathematics education students is oftentimes observed.

Table 4
Significant Relationship between Learning Environment and Students Attitude towards mathematics

Variables Correlated	Mean	R	p-value	Decision @=0.05
Learning Environment	3.98	0.776	**<.001**	**H_0 Rejected**
Students Attitude	4.04			

Presented in Table 4 was the result of the relationship between learning environment and students' attitude towards mathematics. r(148) = 0.776, p<.001. Since, the probability value (p<.001) is less than the level of significance (α =0.05), this means that the null hypothesis is not accepted. Therefore, there is a high positive and linear relationship between learning environment and the students' attitude towards mathematics among teacher education mathematics students.

Table 5
Significant Relationship between Mathematics motivation and Students Attitude towards mathematics

Variables Correlated	Mean	R	p-value	Decision @=0.05
Mathematics Motivation	4.13	0.812	**<.001**	**H_0 Rejected**
Students Attitudes	4.04			

Table 5 shows the important link between mathematics motivation and students' attitude towards mathematics, r(148) = 0.812, p<.001. Since the probability value(p<.001) is less than the level of significance (α=0.05), the null hypothesis is being rejected. There is a positive and significant relationship between mathematics motivation and students' attitude towards mathematics.

Table 6
Domain/s of Learning Environment can considerably Influence the Students' Attitude towards Mathematics of the respondents

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t-stat	p-value	Decision @ α= 0.05
	B	**SE**	**Beta**			
Teacher Support	0.109	0.0571	0.119	1.91	0.058	H_o Accepted
Classroom Involvement	0.253	0.0610	0.286	4.14	<.001	H_o Rejected
Personal Relevance	0.438	0.0613	0.499	7.16	<.001	H_o Rejected

Note: R^2=0.625, F-ratio= 83.9, P-value= < 0.001

Presented in Table 6 is the result on the influence domain/s or indicators of learning environment that influences the students' attitude among teacher education mathematics students. The results showed that two domains of learning environment which are classroom involvement and personal relevance, appear to be a statistically significant predictor of the level of students' attitude towards mathematics among teacher education mathematics, (β=0.253, p<.001) and personal relevance (β=0.438, p<.001), respectively. Since the p-value of the two domains is less than the level of significance (α=0.05), the null hypothesis is rejected. Which means that classroom involvement and personal relevance of learning environment are a significant predictor of the level of students' attitude of the teacher education mathematics students.

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Table 7

Regression Analysis on which domain of Mathematics Motivation can considerably Influence the Students' Attitude towards Mathematics ofthe respondents

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t-stat	p-value	Decision @ α= 0.05
	β	SE	Beta			
Intrinsic Value	0.392	0.0691	0.411	5.68	<.001	H_0 Rejected
Attainment Value	0.263	0.0720	0.281	3.66	<.001	H_0 Rejected
Self-regulation	0.225	0.0641	0.228	3.50	<.001	H_0 Rejected

Dependent Variable: *Students Attitude* ***Adjusted R square: .658 F-ratio: 96.5***

P value: $p<0.001$

Presented in Table 7 is the result on the influence domain/s or indicators of mathematics motivation that influences the students' attitude among teacher education mathematics students. The results showed that three domains of mathematics motivation, intrinsic value, attainment value, and self-regulation, appear to be a statistically significant predictor of the level of students' attitude among teacher education mathematics students-intrinsic value (β=0.392, p<.001), attainment value (β=0.263, p<.001), and self-regulation (β=0.225, p<.001), respectively. Since the p-value of the domain is less than the level of significance (α=0.05), the null hypothesis is rejected. Which means that they are a significant predictor of the level of students' attitude towards mathematics of teacher education mathematics students.

RECOMMENDATION

Based on the previously mentioned findings form the study, the following recommendations were formulated. It is hereby recommended that the educational institution focus on enhancing the quality and comprehensiveness of learning environment that nurtures the classroom involvement of the students especially in recognizing student opinions during class discussions. This could involve incorporating interactive activities, such as group work and hands-on projects, encourages student participation. Connecting lessons to real-world situations and student interests makes the content more relevant and relatable. Additionally, flexible seating arrangements promote collaboration, and offering student choice in topics or projects increases their investment in learning. Incorporating positive reinforcement and recognition of participation can motivate others to get involved and could significantly accommodate diverse learning needs and pace may also be considered.

CONCLUDING REMARKS

In conclusion, correlation of two variables reveals a positive and significant relationship between the two variables which was learning environment and students' attitude towards mathematics of the mathematics education students. The study shows that the learning environment has a high, positive, and significant relationship with students' attitude towards mathematics of the students, which means that the first null hypothesis proposed in the study is rejected.

Moreover, based on the result of regression analysis, two domains have shown significant influence to the learning environment. This means that the domain – classroom involvement and personal relevance – are the significant predictors of students' attitude towards mathematics of the mathematics education students. This also indicates the rejection of the second null hypothesis proposed in the study. Accordingly, the model describes 62.5% of the statistical variation in the level of learning environment of the respondents, while the remaining 37.5% refers to other variables that have not been included in the study that also affect the students' attitude towards mathematics of the respondents.

Furthermore, based on the result of regression analysis, three domains have shown significant influence to the mathematics motivation. This means that the three domains – intrinsic value, attainment value, and self-regulation – is the significant predictor of students towards mathematics of the mathematics education students. This also indicates the rejection of the second null hypothesis proposed in the study. Accordingly, the model describes 65.8% of the statistical variation in the level of attitude towards learning mathematics of the respondents, while the remaining 34.2% refers to other variables that have not been included in the study that also affect the students' attitude towards mathematics of the respondents.

Lastly, the findings from this study reaffirm the significance of study habits and critical thinking motivation in learning, supporting Socio-cultural Learning Theory (Vygotsky, 1962), which emphasized the role of social interaction, cultural context and the environment in shaping cognitive development. Vygotsky's theory posits that individuals learn from their environment, and self-concept is influenced by their observations, experiences, collaboration, and self-efficacy beliefs. The development of the theory is predicated on the idea that environmental, behavioral, and cognitive factors all influence learning. Moreover, it is also supported by the Self-Determination

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Theory of Deci and Ryan, (1985) which focuses on the importance of autonomy, competence, and relatedness in motivating human behavior. Based on the results, this study firmly anchors the theories of Vygotsky and Deci and Ryan, in the context of learning, reinforcing the importance of learning environment, mathematics motivation, and students' attitude in education.

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