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Mathematics Classroom Climate as Correlate of Students' Attitude towards Mathematics among Public High School Students

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Abstract:

The main purpose of the study was to determine the relationship of mathematics classroom climate to the attitude of the students towards mathematics. Specifically, this study sought to determine the mathematics classroom climate in terms of cohesiveness, satisfaction, goal-orientation, and competition, and the level of students' attitude towards mathematics in terms of value, enjoyment, self-confidence, and motivation. The descriptive-correlation method of research was used in the study. The population covered was the high school students from four public secondary schools in Santa Maria, Bulacan, with a total of 8906 students. The researcher employed stratified random sampling and came up with 576 students as sample. Findings of the study showed that mathematics classroom climate in all dimensions namely cohesiveness, satisfaction, goal-orientation, and competition, was perceived by the students as conducive. In terms of attitude towards mathematics, students have very positive attitude in terms of value of mathematics, positive attitude in terms of enjoyment and motivation with mathematics, and neutral attitude in terms of self-confidence with mathematics. Over-all, mathematics classroom climate was conducive and students' attitude towards mathematics is positive.

Using correlation analysis, it was revealed that all dimensions of class room climate have significant positive relationship with the dimensions of students' attitude towards mathematics.

Key words: classroom climate, attitude, mathematics, correlate

INTRODUCTION

In educational setting, success is measured by academic achievement, or on how well a student meets standards set out by the school itself. It is the extent to which a learner is profiting from instruction in a given area of learning. In other words, achievement is reflected by the extent to which the knowledge is attained and the skill is developed in the learners. When concern is expressed about the achievement of students, mathematics is usually singled out as being a particularly worrying problem. It seems that the whole world regards it as very important, that students should be able to demonstrate a high level of proficiency in the subject.

Educational researchers often are interested in assessing the attitudes of students towards mathematics and its importance in students' achievement. Many researches have shown significant levels of relationship between attitude and mathematics achievement.

Attitude towards mathematics has been looked from a variety of perspective and among various populations. Studies to date have investigated gender differences in mathematics achievement, as well as relationships between attitudes towards mathematics and some related factors.

As teachers struggle with reform to improve students' academic performance in mathematics, their concerns must encompass more than instructional change. Understanding the classroom climate in the mathematics class is an important area of research. This may help the teachers to effectively teach the students and improve their achievement in mathematics. The fundamental core of effective teaching of mathematics combines an understanding of how children learn, how to

promote that learning and how to plan for and assess that learning on a daily basis.

THEORETICAL FRAMEWORK

To be able to support this research work, the researcher provides some theories where the study will anchor. One of these theories is the "Social Learning Theory" of Bandura (1977). Social Learning Theory suggests that individuals can learn from observing others receive consequences. This theory emphasizes the importance of observing and modeling the behaviors, attitudes and emotional reactions of others. According to Bandura, "Learning would be exceedingly laborious not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed and on later occasions this coded information serves as a guide for action."

Another theory is Skinner's Theory of Classroom Management. This theory accentuates that the frequent use of reinforcements or rewards modify and influence student's behavior and attitude. Skinner believes that the goal of psychology, as it relates to education, should be to find ways to make education enjoyable and effective for all students. His learning theory relies on the assumption that the best way to modify behavior was to modify the environment. Skinner's primary contribution to behavioral management philosophy has been from his research on operant conditioning and reinforcement schedules. An operant is a behavior that acts on the surrounding environment to produce a consequence. As the result of the consequence, the operant's likelihood of recurring is affected. The operant is said to be reinforced if the consequence increases the likelihood of the behavior's occurrence.

CONCEPTUAL FRAMEWORK

The conceptual framework of this study is schematically presented in Figure 1. The study intended to look into the relationship of classroom climate to the student's attitude towards mathematics. Student's attitude towards mathematics in terms of value, and enjoyment of mathematics, and self-confidence and motivation with mathematics are the dependent variables while classroom climate in terms of cohesiveness, satisfaction, goal orientation and competition are the independent variables.

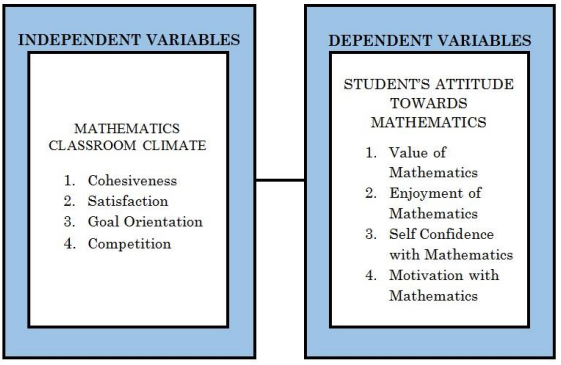

Figure 1. Conceptualized relationship among variables

THE PROBLEM

The main purpose of the study was to determine the relationship of mathematics classroom climate to the attitude of the students towards mathematics. Specifically, this study sought to determine the mathematics classroom climate in terms of cohesiveness, satisfaction, goal orientation, and competition, and the level of students' attitude towards mathematics in terms of value, enjoyment, self-confidence, and motivation.

REVIEW OF LITERATURE

Attitude towards mathematics denotes interest or feeling towards studying mathematics. It is the students' disposition towards 'like' or 'dislike' of mathematics. Research on attitude has a long history in mathematics education. The construct finds its origin in the field of social psychology (Allport, 1935), in connection with the problem of foreseeing individuals' choices in contexts like voting, buying goods, etc. Research develops more toward the formulation of measuring instruments than toward the theoretical definition of the construct, producing instruments that have given theoretical and methodological contributions of great importance.

The attitude construct gains renewed popularity with the re-evaluation of affect in the learning of mathematics: in the classification of Mc Leod (1992) it is considered together with beliefs and emotion one of the constructs that constitute the affective domain. Even if the meaning of the various terms is not always agreed upon, or even made explicit there is consensus on the fact that emotions and beliefs deeply interact: as regards attitude, an emotional component is generally explicitly recognized in the construct, often together with a cognitive component, mainly identified with beliefs.

Review of relevant literature depicts varying opinions and findings on the students' attitude towards mathematics and their performances. Numerous studies in the past years have established and validated the relationship between students' attitudes and academic achievement.

According to Keeves (2002) and Postlethwaite and Wiley (2001), attitudes towards mathematics are, in general, highly favoured, indicating strong support for mathematics and the learning of mathematics. There is also consistency across countries and age levels within a country, in the average level of attitude towards mathematics by students. The researchers however concluded that there is marked decline in attitude

towards mathematics between the ten-years old and fourteen-years old levels. Greenfield (2005), Parker, Revinue and Fraser (2006), Mullis, Martin, Beaton, Gonsale, Kelly and Smith (2008) in their findings revealed that in countries where there was an emergent thirst for industrial and technological development, there were very favourable attitudes towards mathematics. However, in countries where a high level of technological and industrial development had been achieved, the findings showed that attitude towards mathematics were more neutral. Generally, boys held more favourable attitude towards mathematics, the findings concluded.

Keeves (2002) asserted that attitude towards mathematics are known to decrease as students' progress through their schooling years. He further submitted that attributes such as enthusiasm, respect for students and personality traits have been shown to influence students' attitude towards mathematics as well as in other subjects. The implication of Keeves' findings is that attention should be given to mathematics teaching early so as to enable students have favourable disposition towards mathematics later in life.

Burstein (2002) in a comparative study of factors influencing mathematics achievement found out that there is a direct link between students' attitudes towards mathematics and student outcomes. He also found that 25% in England and 26% in Norway accounted for the variation in students' attitude towards mathematics that were due to student gender, maternal expectation, expectations of the students friends, and success attribution (belief about success in mathematics). Student beliefs and attitudes have the potential to either facilitate or inhibit learning. Gibbons, Kimmel and O'Shea (2007) opined that students' attitudes about the value of learning mathematics may be considered as both an input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower performance. This means that those

students who do well in a subject generally have more positive attitudes towards that subject and those who have more positive attitudes towards a subject tend to perform better in that subject.

As mathematics teachers struggle with reform to improve students' achievement in mathematics, their concerns must encompass more than instructional change. Classroom climate is an important factor in the school's environment that can either impede or support learning. Much focus primarily on classroom climate or classroom environment and its relationship to student's attitude must be given full attention.

Classroom climate is defined as "the intellectual, social, emotional, and physical environments in which our students learn. Climate is determined by a constellation of interacting factors that include faculty-student interaction, the tone teachers set, instances of stereotyping or tokenism, the course demographics student-student interaction, and the range of perspectives represented in the course content and materials".

Research conducted over the past 30 years has shown the quality of the classroom environment in schools to be a significant determinant of student learning. According to Fraser, (2008) students learn better when they perceive the classroom environment positively. Numerous research studies have shown that student perceptions of the classroom environment account for appreciable amounts of variance in learning outcomes, often beyond that attributable to background student characteristics. O'Reilly (2005) investigated the relationship between achievement and classroom environment in 48 mathematics classes in Ontario and found that the set of 15 Learning Environment Inventory scales accounted for 67% of variance in raw achievement scores. From a methodological perspective, O'Reilly's study is significant in that it confronted the unit of analysis issue of learning environment research.

Other studies have used classroom environment scales as dependent variables in investigating variations in environment across different settings. Studies reviewed by Fraser (2008) have shown that classroom environment varies according to school, year level and subject area. The learning environment field has developed rapidly with an array of validated instruments and research in at least twelve domains (e.g. comparison of actual and preferred environments, school psychology, and teacher education). Typically, empirical studies have employed these instruments or contextually modified derivatives to assess the particular environment under investigation.

METHODOLOGY

The descriptive-correlation method of research was used in the study. The population covered was the high school students from four public secondary schools in Santa Maria, Bulacan with a total of 8,906 students. These schools are Catmon National High School, Fortunato F. Halili National Agricultural School, Pulong Buhangin National High School, and Santa Maria National High School. A total of 576 students were considered as sample of the study which were chosen randomly from the class lists using stratified random sampling technique. The main instrument used in this study was a survey questionnaire. The first part of the questionnaire measured the Mathematics Classroom Climate. It consists 40 items which measured cohesiveness (10 items), satisfaction (10 items), goal orientation (10 items), and competition (10 items). The second part of the questionnaire is the Attitudes Toward Mathematics Inventory (ATMI). The 40-items of the ATMI were divided into four factors namely, value of Mathematics, enjoyment of Mathematics, self-confidence with Mathematics and Motivation with mathematics.

The researcher used weighted mean and correlation analysis to analyze and interpret the data collected. All statistical computations were done with the use of Statistical Package for the Social Sciences (SPSS).

RESULTS AND DISCUSSIONS

1. Mathematics Classroom Climate

Table 1: Weighted Mean and Verbal Interpretation of Mathematics Classroom Climate

Dimensions	Weighted Mean	Verbal Interpretation
Cohesiveness	3.94	Conducive
Satisfaction	4.09	Conducive
Goal Orientation	4.00	Conducive
Competition	3.95	Conducive
Over-all Classroom Climate	**4.00**	**Conducive**

Table 1 presents the mathematics classroom climate as rated by the students. As shown, Satisfaction got the highest weighted mean of 4.09 interpreted as conducive. It was followed by goal orientation with weighted mean of 4.00, completion with weighted mean of 3.95 and cohesiveness with weighted mean of 3.94, all interpreted as conducive. The over-all weighted mean of 4.00 signifies that the classroom climate in their mathematics class is conducive to learning mathematics.

2. Attitude Towards Mathematics

Table 2: Weighted Mean and Verbal Interpretation of Students' Attitude Towards Mathematics

Attitude Towards	Weighted Mean	Verbal Interpretation
Value of Mathematics	4.38	Very Positive
Enjoyment of Mathematics	3.95	Positive
Satisfaction with Mathematics	3.40	Positive
Motivation with Mathematics	3.72	Positive
Over-all Attitude towards Mathematics	**3.86**	**Positive**

Table 2 shows the attitude of the students towards mathematics. As revealed, students garnered the highest weighted mean of 4.38 in terms of Value of Mathematics which implies a very positive attitude. Enjoyment of Mathematics got the second highest weighted mean of 3.95 which indicates positive attitude. Motivation and Satisfaction with Mathematics posted weighted means of 3.72 and 3.40, both signifies positive attitude. The total weighted mean of 3.86 implies the positive attitude of the students towards mathematics.

3. Relationship Between Mathematics Classroom Climate and Attitude Towards Mathematics

Using correlation analysis, it was revealed that all dimensions of classroom climate have significant relationship with the students' attitude towards mathematics. The over-all classroom climate got the correlation coefficient of 0.584 which implies moderate high positive relationship. Among the dimensions, satisfaction has the highest correlation coefficient of 0.577, indicating a moderate high positive correlation. Goal orientation, cohesiveness, and competition got the respective correlation coefficients of 0.497, 0.381, and 0.364, all signifies moderate low correlation with students' attitude towards mathematics.

Table 3: Correlation Analysis between Mathematics Classroom Climate and Attitude towards Mathematics

Independent Variables	r	p – value	Interpretation	Decision	Conclusion
Cohesiveness	.381	.000	Moderate Low Positive	Reject H_o	Relationship is Significant
Satisfaction	.577	.000	Moderate High Positive	Reject H_o	Relationship is Significant
Goal Orientation	.497	.000	Moderate Low Positive	Reject H_o	Relationship is Significant
Competition	.364	.000	Moderate Low Positive	Reject H_o	Relationship is Significant
Over-all Classroom Climate	.584	.000	Moderate High Positive	Reject H_o	Relationship is Significant

Conclusions

Based on the findings, the researcher has drawn the following conclusions.

1. Mathematics Classroom Climate

The classroom climate in all dimensions namely cohesiveness, satisfaction, goal orientation and competition was perceived by the students as "Conducive". Over-all, students had positive experience and the atmosphere in their mathematics class.

2. Attitude Towards Mathematics

In terms of attitude towards mathematics, students possess very positive attitude in terms of Value of Mathematics and positive attitude in terms of Enjoyment, Self-confidence, and Motivation with mathematics. Students have favorable beliefs on the usefulness, relevance and worth of their mathematics subjects. They also have high level of enjoyment, positive outlook and self-concept, and are confident in working with mathematics. This clearly shows that students have positive and favorable emotional disposition towards their mathematics subjects.

3. Relationship Between Mathematics Classroom Climate and Attitude Towards Mathematics

Using correlation analysis, it was revealed that all dimensions of mathematics classroom climate have significant positive relationship with the dimensions of students' attitude towards mathematics. This is an indication that the atmosphere and experiences of the students in their mathematics class may positively affect the student's emotional disposition towards mathematics.

RECOMMENDATIONS

Based on the findings and conclusions derived from the study, the following recommendations are proposed.

1. Seen as an important factor affecting the attitude of students, classroom climate must be conducive to learning. Teachers must maintain and promote positive atmosphere in the classroom. Teachers must create an environment that is inclusive of all its members regardless of their capabilities, interests, or cultural and socio-economic background. The classroom should be a safe and supportive environment in which all students have a right to learn and develop through rich and engaging activities.
2. Viewed as an important factor affecting the mathematics achievement, it is necessary and essential that students' attitude towards mathematics be improved. Mathematics teachers may improve the attitude of the students by making mathematics teaching enjoyable and more active. This may help our students to build self-confidence and appreciate the value of mathematics.
3. Further researches on the possible factors influencing the attitudes of the students in mathematics shall be conducted for further developments. Some of these factors to consider are the environment beyond the classroom, and changes in technology and social culture.

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