



## **Examining the Association between Attitude towards Mathematics and Student Achievement**

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### **ABSTRACT**

The study aimed to determine the relationship between attitude toward mathematics and students' achievement among students. This study utilized a non-experimental correlational research design. Utilizing an adapted and validated questionnaire in data analysis with Mean and Pearson Product-Moment Correlation, it was found that the level of attitude towards mathematics is moderate, and the student achievement is high. It was also found that the attitude toward mathematics is not significantly correlated to the student's achievement. It was concluded that the attitude towards mathematics is fairly evident, and the student's academic achievement is very satisfactory. The researchers recommended that future researchers conduct a study on other factors that may affect students' attitudes not included in this study and conduct the same research in a new context, location, or culture; use other research designs, involve more respondents, and widen the scope of the study.

Keywords: attitude, mathematics, student achievement

### **1. Introduction**

The lack of attention to the emotion and attitude of the student is one of the facts to focus on research. Most of the research in the past had looked at the products, not at the process. Past research gives more emphasis on the effectiveness of the products in the field of education, but how about during the process, the time when students acquire all the learnings and how they deal with it to produce a certain product. This paper aims to understand how certain different but interrelated variables could lead to an explanation of students' attitude towards Mathematics and to understand the defining characteristics of this attitude in the classroom environment.

In 2011, a research conducted at Maldives by Mohammed & Waheed, it was said that the students had positive attitude towards mathematics at moderate level, it showed that there were still possible room for improvement. However, it is interesting to know that despite of the learning outcome of Maldivian students in mathematics, the attitude of the respondents of this study is fairly positive. It is observed that having further studies on improving the students' attitude towards the subject in Mathematics will find factors in influencing students attitude towards difficulty in Mathematics.

In the Philippines, the University of the Philippines' greatest failure is in mathematics. It is also said that repetition in mathematics is common among UP students that almost one out of three repeat a mathematics course. Furthermore, the faculty of the UP Cebu, Natural Science and Mathematics Division (NSMD) had felt the declining performance of students in basic mathematics. It was also stated that the attitude towards mathematics and the learning outcome in mathematics had always been a great concern (Cabahug & Ladot, 2005). In the study conducted at the Lyceum of the Philippines University (2013), it was stated that the respondents have a positive attitude in mathematics. However, even if the students try to develop positive attitudes in Mathematics, they still find hard time learning the subject (Alroaia et.al, 2013).

In the locale selected in this study, the researchers got the final grades of the students who took Integrated Mathematics. It was found out that 8 out of 40 students were having a grade of 75 and the overall rating gained in the level of academic achievement in the course in terms of their grades was 77.7, obtaining poor as its descriptive equivalent. Thus, the researchers prompted to investigate the possible relationship of attitude towards Mathematics and students achievement among Integrated Mathematics students.

The study aimed to determine the significance of the relationship between Attitude towards Mathematics and its relationship to the students' achievement among the students of the course Integrated Mathematics. More specifically, it sought to answer the following questions:

1. What is the level of attitude towards mathematics among students in terms of positive and negative attitude?
2. What is the level of students' achievement among the students of Integrated Mathematics?
3. Is there a significant relationship between attitude towards Mathematics and students achievement?

## 1.1 Review of Related Literature

### *Students' Attitudes*

Definitions of attitude towards mathematics are numerous as researchers' and thinkers' conceptions, ideas and perspectives vary. According to a point of Research had shown that positive attitude towards mathematics leads students towards success in mathematics. According to Tamara Baruhovich (2008), "Your attitude plays a major role in every single aspect of your life. If what you want is to get ahead and lead a fulfilled life, then you must learn to develop a positive attitude for success. Your attitude reflects in everything you do and everything that happens to you. The Law of Attraction is basically a concept which explains that you attract what you think of the most, so whatever you put out comes back to you. If like attracts like, positive attitudes attract positive events and people into our lives. This is why we must learn to develop a positive attitude in everything we do. When we adopt a positive attitude, it is like setting a clear path for positive outcomes."view, the attitude towards mathematics is just a positive or negative emotional disposition towards mathematics. Research on attitude in mathematics education has been motivated by the belief that 'something' called "attitude" plays a crucial role in learning mathematics but the goal of highlighting a connection between positive attitude and mathematics achievement has not been reached conclusively. In addition they state that despite a large number of studies about attitudes, there is no clear definition of the construct itself. One of the reasons why students performed poorly in Mathematics is their attitude towards the subject, (Zan & Martino, 2007). Among people, it was found that different perceptions or ideas about mathematics leading to show certain attitudes towards it; and "various investigations have since revealed that the success and failure in mathematics depends on more than just knowledge of certain mathematical content requirements (Morales, 2009).

According to Mohammed (2011), attitude is a central part of human identity. Everyday people love, hate, like, dislike, favour, oppose, agree, disagree, argue, persuade etc. Attitude contributes to the student's academic achievement (Bycio & Allen, 2007). The characterisation of attitude in these early studies is that typical of the social sciences, seeing attitude toward mathematics as the emotional disposition toward the discipline, thus identifying a positive/negative attitude toward mathematics as a positive/negative emotional disposition ('I like/dislike mathematics'). In this early period, some important results have been obtained, in particular about the relationship between attitude towards mathematics and the choice of mathematical courses.

Attitude as a concept is concerned with an individual's way of thinking, acting and behaving. It has very serious implications for the learner, the teacher, the immediate social group with which the individual learner relates, and the entire school system. Attitudes are formed as a result of some kind of learning experiences students go through. This is mimicry, which also has a part to play in the teaching and learning situation. In this respect, the learner draws from his teachers' disposition to form his own attitude, which may likely affect his learning outcomes (Yara, 2009).

### *Positive Attitude*

As mentioned by Balbalosa (2010) those who have positive attitude towards Mathematics have better performance in the subject. Positive attitudes towards mathematics reflects a positive emotional disposition in relation to the subject. Researchers said that positive attitude towards mathematics leads students towards success in mathematics. Attempt to improve attitude towards mathematics at lower level provides base for higher studies in mathematics. It also causes effect in achievement of mathematics at secondary school level, Ma and Xu (2004), cited by Balbalosa (2010).

In Bureti, the findings in secondary schools indicated that fifty-six percent of the respondents strongly agreed that they enjoyed learning mathematics as a subject. Forty nine percent of the respondents strongly agreed that they would like to continue doing mathematics after secondary school citing reasons such as Mathematics was easy to study and that it was a logical subject while seventy percent of the respondents strongly agreed that mathematics was very useful subject in life. In addition sixty one percent of the respondents strongly disagreed that being a girl or a boy interfered with their learning and performing well in Mathematics (Mutai, 2011).

Those who had positive attitude towards Mathematics had better performance in the subject; a positive attitude towards mathematics reflects a positive emotional disposition in relation to the subject. These emotional dispositions have an impact on an individual's behaviour, as one is likely to achieve better in a subject that one enjoys, has confidence in or finds useful for this reason positive attitudes towards mathematics are desirable since they may influence one's willingness to learn and also the benefits one can derive from mathematics instruction (Mata, et. al 2012).

Students' attitudes towards Mathematics should be given attention in teaching the subject if one is serious in advancing the performance of the students. This can only be developed in the presence of a healthy environment. Hence, there should be a positive learning environment so that students can develop a positive attitude towards the subject which would lead to better performance (Tran, 2012). Aside from environment, teachers' attitudes and beliefs, teaching styles and parental attitudes were identified as explanation factors that account for the student's attitudes towards mathematics (Asante, 2012; Vukovic et al., 2013).

Mato and De La Torre (2009) in a study with secondary school students also showed that those with better academic performance had more positive attitudes regarding math than those with poorer academic performance. These results were confirmed in wider research, concerning math study attitudes among the secondary school students of nine countries, developed by Sanchez et al. The work of Akey (2006) showed that several aspects of school context (e.g., teacher support, student-to-student interaction, and the academic and behavior expectations of the teacher) were significantly related to student attitudes and behaviors. Akey (2006) concluded that the class environment where teachers who students see as supportive promote student feelings of control and confidence in their ability to succeed. The way students perceive teacher characteristics will affect their attitudes towards mathematics. A student can develop positive attitude towards Mathematics because he or she learns to associate positive experiences or events with it. Also, positive reinforcement creates room for the formation of positive attitude for Mathematics (Mensah et al., 2013).

### *Negative Attitude*

In secondary schools in Bureti District, the study revealed that twenty six percent of the respondents agreed that they felt extremely anxious and fearful when math exams were mentioned or brought. There were a few students who do not like the subject by stating that mathematics was difficult (eighteen percent who strongly agreed or just agreed) and that some topics were not applicable to daily life problems. Those who agreed that the subject was impossible to learn said that Mathematics was for intelligent students since it was tough subject and that few students managed to study the subject to higher levels. When asked whether Mathematics should be a compulsory subject up to sixty-two percent disagreed (Mutai, 2011). Some students developed a simplistic view of mathematics as learning simple steps and getting one correct answer without relating the concept to real life applications. Students with this rigid view developed strong negative feelings toward mathematics when their attempts at understanding fail (Nardi & Steward, 2003). If math is discussed, it seems strange; ordinary people are not able to understand it. It is as if a few human beings were endowed with a kind of chip in their brains, allowing them to process this expertise; nevertheless, what about others, who think that they will never use mathematical knowledge in their social environment. This problem gets worse when they have a negative attitude due to their poor academic performance in mathematics; revealing that majority of these students (who have negative attitude) do not see a utility of mathematics in their lives (Morales 2009).

In general, students who learn mathematics through traditional methods of instruction such as listening, sitting alone, and minimal active engagement will develop inflexible views of mathematics. These students are not taught to think critically about mathematical relationships and seek the pleasure of mathematical insights. They fear that learning will result in embarrassment and humiliation which in turn inhibits them from behaving in ways that might help them e.g. avoiding classes and failing to do assignment” (Theresa, 2006 ; Langat, 2015). Poor attitude towards mathematics has often been cited as one of the factors that contributed to lower participation and success of girls in mathematics (Willis, 1995; Fullarton, 1993). Interest and attitude in the subject are the special predictors for the students’ participation and success in the subject. Nicolaidou and Philippou (2003) showed that negative attitudes were the result of frequent and repeated failures or problems when dealing with mathematical tasks and these negative attitudes may become relatively permanent. According to these authors when children first go to school, they usually have positive attitudes towards mathematics. However, as they progress their attitudes become less positive and frequently become negative at high school (Mata et al., 2012). There are a number of factors which can explain why attitudes towards mathematics become more negative with the school grade, such as the pressure to perform well, over demanding tasks, uninteresting lessons and less than positive attitudes on the part of teachers.

The study of Brown et al., (2008) found out that the low participation of mathematics in UK was due to the perceived difficulties, lack of confidence, dislike, boredom, and lack of relevance on the subject. Their choice had significant relationship on their attitude towards mathematics and the main reason why others discontinue studying mathematics because of their perception as boring, hard, and useless.

### *Achievement*

While most reform efforts seem to embrace the importance of proper learning objectives and instructional methods, they fail to realize the full impact of students’ attitudes and beliefs to learning and achievement. This study confirms the fact that instructional design alone however relevant it may be, cannot alone result in better learning and achievement. The instructional designers must embrace other crucial factors touching on the affective domain which have been proved to affect student learning in a bid to strive and build a bridge between the goals or objectives of mathematics and the student performance. It is important to note that students are not just cognitive individuals but also social persons with beliefs, emotions that influence their learning and achievement (Zan et al., 2006).

The major problem in the learning and performance in mathematics in secondary schools included lack of confidence in the ability to learn and perform well in mathematics as reported by forty percent of the respondents. Lack of interest in mathematics was mentioned by twenty-four percent of the respondents while lack of teaching facilities such as textbooks and learning resources was mentioned by twenty-one percent of the respondents. Some students’ dissatisfaction on how some mathematics teachers taught the subject was related to the fact that sixty eight percent of the respondents felt there were not enough reference books and textbooks, making students perform poorly in mathematics and loose interest in the subject. Sixty percent of the respondents reported that their friends did not like learning mathematics with them which meant that percentages of respondents were intrinsically motivated to learn and perform in Mathematics. This further meant that students had formed favourable attitudes towards learning and performance of mathematics (Mutai, 2011).

The teachers may knowingly or unknowingly depict high achievers as the probable achievers in mathematics examinations but low-attainers to be the automatic failures in examinations and they show it openly (Wasiche 2006). Despite applying different strategies and techniques, still the problem of low performance emerges. One of the reasons why students performed poorly in Mathematics is their attitude towards the subject. Several studies proved that their attitude had strong relationship with their academic performance (Parker et al., 2013).

In a study with secondary school students showed that those who are better academically have more positive attitudes towards Mathematics than those with low academic performance hence repeated failures in mathematics leads to unfavorable attitudes. Student’s attitude towards of learning mathematics may be considered as both input and outcome variable as attitude towards the subject can be related to educational achievement in ways that reinforce higher or lower performance, (Mato & De La Torre, 2010).

It determines their ability and willingness to learn the subject, work on a variety of assigned tasks and their persistence in the tasks available. In general, the conceptions students hold about Mathematics determines how they approach mathematics tasks leading them into either productive or non productive orientations. In many cases, students have been found to approach Mathematics as procedural and rule-oriented. This prevents them from experiencing the richness of Mathematics and the many approaches that could be used to develop competence in the subject (Mensah et al., 2013).

Among the elementary school pupils, positive correlation between student attitude and student performance was found. Student beliefs and attitudes were found to have the potential to either facilitate or inhibit learning. They fail to know that through regular and repeated practice they can internalize concepts and facts and not necessarily having to cram them directly. This is also in line with the findings that student beliefs about their competence and their expectation for success in school have been directly linked to their levels of engagement as well as their emotional states that promote or interfere with their ability to be academically successful (Schenkel, 2009). Eggen and Kauchak (2004) as cited by Susan (2014) viewed underachiever as students who are average or above average but despite the teacher's effort in teaching, they have difficult time in learning. This underachievement can be defined as discrepancy between potential (ability) and performance (achievement) or discrepancy between predicted achievement and actual achievement. Some students have academic achievement commensurate with their intelligence. This means that there is no significant discrepancy between their ability to learn and outcomes to achieve. However, others have average or above average intelligence but they continuously perform low achievement in school.

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## **2. Method**

### **2.1 Research Design**

This study employed the non-experimental correlational method of research in investigating the problem. A correlational research is designed to find out relationships among variables and to allow the prediction of future events from present knowledge (Stangor & Walinga, 2019). It was utilized to determine whether a significant relationship existed between attitude and students achievement.

### **2.2 Research Respondents**

The study's respondents were the students of UM Panabo College who were officially enrolled in the Integrated Mathematics course of S.Y 2016-2017. The total population was 97 students divided into two (2) sections. There were 49 students in section one (1), in which there was one student dropped out, and while section two (2) had 48 students, in which there were seven students dropped out, and nine students were not able to answer the survey questionnaire because they were not present after three follow-ups. All in all, 80 out of 89 students, or 89.89% of the total population, were part of the study. In this study, the researchers utilized the universal sampling technique. A universal sampling technique is a technique where not everyone in the population has the same probability of being selected unknown (Kabera, 2009 in Ramoso & Ortega-Dela Cruz, 2019). The universal sampling technique was used where all the members of the two sections were taken as respondents.

### **2.3 Research Instrument**

A set of researcher-made questionnaires should be used to conduct the study. The first part of the constructed questionnaire consists of the Aiken Revised Math Attitude Scale (Aiken, 1963). It consists of 20 questions with five possible answers for each using a Likert scale. The answers range from "Strongly Agree" to "Strongly Disagree." This survey has been revised, but the original and new versions have been used in multiple studies to measure students' attitudes toward mathematics.

The questionnaire was improved in the following manner: First, a set of questionnaires were presented to the adviser for comments and suggestions for improvement and refinement. Second, the adviser checked and approved the instrument for validation to ensure content validity before gathering data. In evaluating the responses of the respondent, the following scale was used. This study utilized a five-point Likert-type scale to interpret and analyze the data responses. In addition, the level of student achievement represented by their examination scores also used a five-level mean rating scale.

### **2.4 Data Gathering Procedures**

In gathering the data, the following processes were used by the researchers:

*Asking for Permission to Conduct the Study*--The researchers submitted a letter addressed to the Assistant Vice President of the institution, asking permission to allow them to conduct the study and to distribute the questionnaires to the respondents. After the approval of the letter, the researchers asked permission from the adviser of the respondents to administer the test questionnaires during his/her class time.

*Administration of the Questionnaires*--After the approval of the letter, the researchers asked permission to administer the test from the respondents' teachers. The researchers administered the questionnaires to the respondents and gave them instructions on how to answer them.

*Retrieval of the Questionnaires*--After the time allotted, the researchers collected the questionnaires from the students. Data extracted from the questionnaire were classified, organized, and tabulated accordingly.

### **2.5 Statistical Treatment of Data**

The following statistical tools were used by the researchers to interpret the data collected:

*Mean*--This was used to determine the level of students' attitude towards mathematics and level of student achievement among students.

*Pearson Product-Moment Correlation Coefficient*--This statistical tool was used in determining the relationship between attitude towards mathematics and student achievement.

### 3. Result and Discussion

#### 3.1 Level of Attitude towards Mathematics

Table 1 presents the level of attitude towards mathematics. The students' positive attitudes toward mathematics got a mean score of 3.49, described as high. This means that a positive attitude is highly evident. As perceived by the respondents, it is also highly apparent that Mathematics is an interesting, fun subject and makes them feel secure and stimulating. Further, the respondents feel good about dealing with Mathematics and feel a definite positive reaction to Mathematics because it is enjoyable. In addition, the respondents perceived that Mathematics is something they enjoy greatly and a subject they have always enjoyed studying. The result of this study was similar to the study of Karjanto (2017), which revealed that college students showed a positive attitude toward mathematics.

**Table 1.** *Level of Attitude towards Mathematics*

Indicators	Mean	Descriptive Equivalent
<i>Positive Attitude</i>	3.49	High
<i>Negative Attitude</i>	2.82	Moderate
Overall Mean	3.15	Moderate

On the other hand, the student's negative attitude got a mean score of 2.82, described as moderate. This means that the negative attitude towards mathematics is fairly evident. It implies that respondents were reasonably challenged to answer complicated problems, interested in studying mathematics if it is optional, and do mathematics for compliance only. It is also fairly evident that the respondents perceived that mathematics to them is toxic and makes them uncomfortable. In addition, when the respondents start a math problem, they do not know where to start or what to do next. It makes them nervous even to think about having to do mathematics problems. This moderate negative attitude can be attributed to the mixed perceptions of the respondents. Other students feel that Mathematics is boring, toxic, difficult to understand, and uninteresting, for compliance makes them nervous, while others are not.

The students generally have a moderate attitude toward Mathematics, as reflected in their mean score of 3.15. This means that the level of attitude towards Mathematics is fairly evident. Students with negative attitudes tend to dislike mathematics, considering it useless and anxious to engage in it (Wigfield et al., 2016; Guo et al., 2015; Chouinard et al., 2007; Wigfield & Eccles, 2000). However, when students have a positive attitude toward mathematics, they tend to like it, view it as an essential subject, and have confidence in engaging in it (Mullis et al., 2020). A positive attitude towards mathematics reflects a positive emotional disposition concerning the subject. These emotional dispositions have an impact on an individual's behavior, as one is likely to achieve better in a subject that one enjoys, has confidence in, or finds helpful for this reason, positive attitudes towards mathematics are desirable since they may influence one's willingness to learn and also the benefits one can derive from mathematics instruction (Mata et al., 2012).

#### 3.2 Level of Student Achievement

Table 2 presents the level of students' achievement of Integrated Mathematics students as indicated by their scores in the examination. The overall mean score is 33.48 with a descriptive equivalent of high; it means that the student's achievement in math is very satisfactory and that the students are good at math. Students are likely to achieve superior performance in Mathematics because students with higher levels of "value of," "enjoyment of," and "confidence in" mathematics are willing to study mathematics and keep on in the face of adversity (Guo et al., 2015; Chouinard et al., 2007).

**Table 2.** *Level of Student Achievement*

Indicator	Mean	Descriptive Equivalent
Examination Scores	33.48	High

#### 3.3 Significance of the Relationship between Attitude towards Mathematics and Student Achievement

Table 3 shows the significant relationship between attitude towards mathematics and student achievement. It is shown that the computed  $r$ -value is -0.051, and the  $p$ -value is 0.653, which is greater than 0.05; thus, the null hypothesis was accepted. This implies that no significant relationship exists between students' attitudes toward Mathematics and their achievement. This finding affirms several researches (Mubeen et al., 2013; Phonguttha et al., 2009; Koller et al., 2001; Papanastasiou, 2000) that reported a nonsignificant association between them. It can be deduced that some factors that might affect student achievement are not included in the study.

**Table 3.** Significance of the Relationship between Attitude towards Mathematics and Student Achievement

Independent Variable	Dependent Variable	r-value	p-value	Decision on Ho
Attitude towards Mathematics	Student Achievement	-.051	0.653	H <sub>0</sub> is accepted

#### 4. Conclusion and Recommendation

Based on the findings of the study, the conclusions were drawn:

- The level of attitude towards mathematics is moderate. This means that the attitude of the students in dealing with Mathematics is fairly evident.
- The level of student achievement is high. This means that their achievement in mathematics is very satisfactory.
- There is no significant relationship between the attitude towards Mathematics and student achievement. Some factors that might affect student achievement are not included in the study.

Based on the findings and conclusion, the following recommendations were drawn:

- School administrators should create programs, specifically on habits of the mind that could eliminate the negative attitude of the students.
- Teachers should engage their lessons in Math by connecting to real life situations and should implement different strategies to diminish their difficulty in understanding the subject.
- Students should appreciate the importance of Mathematics in their lives.
- Further study may be conducted on other factors that may affect students' attitude not included in this study. Future researchers may conduct same research in a new context, location and/or culture; use other research designs, involve more respondents; and widen the scope of the study.

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