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STUDENTS' ATTITUDE TOWARDS ACHIEVEMENT IN MATHEMATICS: A CROSS SECTIONAL STUDY OF YEAR SIX STUDENTS IN SONGKLHA PROVINCE, THAILAND

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Abstract:

Thailand government noted that mathematics is one of the basic subjects needed in all sphere of endeavor. With this, it is necessary to investigate the relationship between students' attitude towards mathematics and their achievements. This study fulfills that by experimenting 100 students from Songkla province in Thailand using correlation analysis. It was found that there is positive relationship between students' attitude towards learning mathematics and their achievement. In addition to this, further analysis using t-test presents that there is no difference between gender attitude and their achievement in mathematics. The result of this study implies that both male and female students has almost the same achievement in statistics because there is no significant difference in their achievement grade

Keywords: attitude, achievement, mathematics

Introduction

Educators have become more concerned with the affective outcomes of educational programs. The development of a positive attitude toward the subject being studied is probably one of today's most prevalent educational goals. Teachers as well as parents believe that a student's attitudes toward a school subject will affect that student's achievement in the subject (Griffin, 2015). For this reason, positive attitudes towards mathematics are desirable since they may influence one's willingness to learn and also

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the benefits one can derive from mathematics instruction (Atanasova-Pacemska, Lazarova, Arsov, Pacemska, & Trifunov, 2015). Thus, students' attitudes toward mathematics affect how well or how often they do it, and how much enjoyment they derive from it (Moenikia & Zahed-Babelanb, 2010).

In Thailand, the curriculum became standard-based. Students' quality was focus instead of content. Teachers were required to be innovative and to change in dimensions that support students' learning and the process of thinking. Learning achievement was a key element of the core curriculum of Basic Education. According to Basic Education Core, The expected competencies among students, with special focus on Mathematics, deals with the skills in communication, thinking, problem-solving, applying life skill, and technological application that attitude student towards learning mathematics; teacher's awareness to these combinations can help students to maintain a balance among different approaches of teaching and learning mathematics as per the needs and contexts in the classroom. Such a balance of teaching and learning approaches can be helpful to teach mathematics lessons in a meaningful way through which students gain high quality learning experiences.

Mobilizing a set of different definitions concerning attitudes presented since 1935 (Mata, Monteiro, & Peixoto, 2012) defines an attitude towards mathematics as "*a disposition towards an aspect of mathematics that has been acquired by an individual through his or her beliefs and experiences but which could be changed*." When emphasizing the importance of individual experiences, the contexts where students interact with others and with mathematics become important focal points. Fraser and Kahle (2007) have also highlighted this aspect in research which shows that learning environments at home, at school, and within the peer group accounted for a significant amount of variance in student attitudes and, furthermore, that class ethos had a significant impact on the scores achieved by students for these attitudes. In lieu of this, this study aims at examining Thai students' attitude towards studying mathematics.

Review of Literatures

Attitudes toward Mathematics: Meanings

Students' attitudes are developed over a considerably long period of time and have powerful impacts on their effective engagement, participation and achievement in mathematics. Attitudes are not innate but result from experiences and they can be changed. Attitudes are more stable than emotions and feelings, but at the same time, they are malleable influences on participation, because attitudes are formed in response to curriculum, teaching practices, and organizational arrangements (Winter & O'Raw,

2010). Attitudes can be seen as more or less positive. A positive attitude towards mathematics reflects a positive emotional disposition in relation to the subject and, in a similar way, a negative attitude towards mathematics relates to a negative emotional disposition (Mata, Monteiro, & Peixoto, 2012).

In addition, Mohamed and Waheed (2011) when reviewing literature aimed at understanding attitudes and the influences on their development in relation to differences between students, identified three groups of factors that play a vital role in influencing student attitudes: factors associated with the students themselves (e.g., mathematical achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school); factors associated with the school, teacher, and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards mathematics, guidance, beliefs); finally factors from the home environment and society (e.g., educational background, parental expectations). Attitudes can be seen as more or less positive.

A positive attitude towards mathematics reflects a positive self-confidence, value, enjoyment and emotional disposition in relation to the subject and, in a similar way, a negative attitude towards mathematics relates to a negative self-confidence, value, enjoyment and emotional disposition (Atanasova-Pacemska, Lazarova, Arsov, Pacemska, & Trifunov, 2015). These attitede 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 useful (Atanasova-Pacemska, Lazarova, Arsov, Pacemska, Trifunov, & Kovacheva, 2015).

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 (Atanasova-Pacemska, Lazarova, Arsov, Pacemska, & Trifunov, 2015). Thus, students' attitudes toward mathematics affect how well or how often they do it, and how much enjoyment they derive from it (Moenikia & Zahed-Babelanb, 2010). Thus, this study hypothesized that there is a positive relationship between students' attitude to earn mathematics and their achievement in mathematics.

Research Methodology

Sampling

This study is aimed at investigating relationship between students' attitude and achievement in mathematics. A cross sectional method of data collection was employed to collect data from 100 students who participated in this study were Year 6 three

primary schools in Songklha province in Thailand during the second term of the academic year 2015. The three schools were selected based on the same geographical area. The respondents were selected randomly from each school for the survey.

Instrumentation

This study have two major instrument will be used to identify and distinguish the difference between the independent and dependent variables; The Attitude toward Mathematics Inventory (ATMI) will be used to measure the students' attitude toward mathematic learning and The School based test for testing achievement and retention of mathematic subject. The followings are detail descriptions of the instruments used in this study:

1. The attitude toward Mathematics Inventory (ATMI) was employed to evaluate different underlying perspective of students' attitudes toward mathematics (Tapia & March, 2004). Forty items of ATMI consists of four scales: 15 items of self-confidence, 10 items of value, 10 items of enjoyment, and 5 items of motivation (Khine & Afari 2014). The Likert-scale anchors: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree were used (Tapia & Mash, 2004). Moreover, the questionnaire adapted was translated to Thai language and this is validated by Thai teachers who are expert in English language as well (Potaka, & Cochrane, 2004). Cronbach for this test were found to be .78, .805; .803, and .831 for the variables self-confidence, value, enjoyment and motivation respectively which are suitable reliabilities in any research observations (Afari, Aldridge, Fraser & Khinel. 2013)
2. The School Based Test on Achievement adopted from Songkhla Primary Education Service. The 50-items were highlighted the mathematics knowledge of 6^{th} grade students in topics**:** area/perimeter, geometry, algebra, graphing, data management and probability. Sixty items in both tests were instructed by applying Bloom's cognitive domains of taxonomy. As the result, the teats consist the factual information recall; comprehension; application; analysis; and synthesis. Each item is counted for a score of one; therefore, the total score is 50. The items are formatted in the multiple-choice pattern. There are four choices in an individual item.

Procedure

The researcher had asked the provision from all the three schools to participate in the study. As appointed, the first author had gone to the school to deliver the test to the randomly selected students at their vicinity. The questionnaires were given in their usual Mathematics lesson period. Student took almost 60 minutes to finish test and gave break half hour then continuous to took 40 minutes to finish the questionnaires.

However, before the test, the students were briefly explained about the reason for the study and they were informed that those who don't want to participate for any reasons were free to opt out at any time.

Data Analysis

In order to fulfill the objective of this study which is determine the relationship that exist between students' attitude and achievement in mathematics, correlation analysis was employed. Moreover, further analysis which is not in the main objective of this present study was as well carried out. That is, this study examines mean difference between male and female students using T-test analysis.

Results

Descriptive Statistics: The data presents that the students' samples consist of 53% (53) female students and 47 (47%) were male students. This is determined using frequency distribution. This is presented in Table 1.1 below.

Table 1.1: Descriptive Statistics

Gender	Frequency	% Frequency
Male	47	47
Female	53	53

Furthermore, a correlation analysis was conducted on the data. The data present that Thai students has moderate positive relationship to their achievements in mathematics this is presented in the table 1.2 below. In view of (Hemphill, & Vonortas, 2003) correlation values ranges from (-1 to +1) where values close to positive 1 is said to be highly correlated, 1 on both sides means perfectly correlated on both positive and negative side.

The results reported that all the independent variables have positive significant relationship with the dependent variable except for two variables students' self-confidence and value. Other independent variables (enjoyment and motivation) were observed to have positive significant relationship with the achievement score in mathematics having, $r = .268$, $p < .001$ and $r = .232$, $p < .005$ according to the rule of thumb by Cohen (1988), this relationship is relatively small.

In addition, the result presents the relationship that exist among the independent variable. This is done to determine the dimension of students' attitude on ATMI scale which have effects on the subject experimented. The result, interpreted based on Cohen

(1988) scale reveals value and enjoyment has the strongest positive relationship having (*r = .601 p 2< .001)* followed by enjoyment and motivation having, (*r = .587 p < .001*), then, value and self-confidence having, *r = .503 p < .001)*. The relationship between self-confidence and enjoyment as well as, enjoyment and motivation, interpreted on Cohen (1988) scale is seen to be moderately strong positive relationship having *r = .364, p < .001)* and *r = .358, p <.001)*.

Table 1.2: Correlation Table

Correlations

		Achievement	SC	Value	Enjoyment	Motivation
Ach	PC	1				
	Sig. (2-tailed)					
	N	100				
SC	PC	.090	1			
	Sig. (2-tailed)	.371				
	N	100	100			
Value	PC	.174	.503**	1		
	Sig. (2-tailed)	.084	.000			
	N	100	100	100		
Enjoyment	PC	.268**	.364**	.601**	1	
	Sig. (2-tailed)	.007	.000	.000		
	N	100	100	100	100	
Motivation	PC	.232*	.246*	.358**	.587**	1
	Sig. (2-tailed)	.020	.013	.000	.000	
	N	100	100	100	100	100

**. Correlation is significant at the 0.01 level (2-tailed). Ach= Achievement; SC= Self-Confidence.

Additionally, this study also examines if there is difference in gender's achievement as regards attitude towards mathematics. Surprisingly, there is no statistical difference in gender attitude towards their achievement in mathematics as t(98) = .407, ϱ = .394 > .005 this is presented in table 1.2 and Table 1.3 below.

Table 1.3: Independent Samples Test Table

	Gender	n	M	SD	$t_{crit.}$	df	P	Decision
Achievement	Female	53	26.49	7.511	.407	98	.394	No difference
	Male	47	25.26	6.901				

Discussions

The result from the first analysis conducted on the primary data in this investigation presents a positive relationship between the dimensions of students' attitude on ATMI and their achievement in mathematics Winter & O'Raw (2010), Mata, Monteiro, & Peixoto, 2012, Atanasova-Pacemska, et al., 2015. Although, two of the positive relationships were found to be insignificant positive relationships.

From the overall result model (that is the relationship between the dimensions of ATMI and achievement in mathematics), the result found that only enjoyment and motivation were found to have moderately weak positive relationship with the students' achievement in mathematics. While, the other two dimensions also have positive relationship but which is insignificant in this study. This result therefore implies, the subjects through motivation, enjoyed attending mathematics class. However, they could not relate the value (the real life application of the subject taught "*curriculum contents*" with the real life application, therefore, it can be argued that these students have no self-confidence in what they learn in class. The positive relationship according to Winter & O'Raw (2010) can be attributed to the students' interest in response to the mathematics curriculum.

More so, the positive correlation between student's motivation, self-confidence, value and enjoyment and their achievement implies the students has positive attitude towards the course contents as they were able to relate it to their environment. The implication deduced from previous studies regarding this is that, the more the students create interest and are motivated towards learning, they will always possess positive attitude towards learning such subjects leading to high achievement score (See: Aremu, 1998; Mata, Monteiro, & Peixoto, 2012, Atanasova-Pacemska, et al., 2015; Griffin, 2015; Moenikia & Zahed-Babelanb, 2010).

Furthermore, the correlation reading from the data analysis presented in Table 1.2 above thus reads presents that enjoyment and motivation has significant positive relationship. This significant relationship implies the mathematics teachers have succeeded in gaining students' motivation and as well are making the mathematics class enjoyable for the students. Nevertheless, self-confidence and value result from the Table 1.2 above were presented to be insignificant positive relationship.

Thus, using the explanation given by Cohen (1988), correlation value of .1 is said to be small; .3 is said to be medium and that of .5 and above is posited to be large correlation effects. Hence, the correlation value of .268 and .232 (enjoyment and motivation) as presented in this study thus implies that the relationship between Thai students investigated and their achievements in mathematics is small. The small relationship can be attributed to many factors examples of which may include learning environment, the contents of the mathematics curriculum, emotional disposition of what is being taught, teachers' motivation towards learning mathematics, peer group study (Fraser & Kahle, 2007; Mata, Monteiro, & Peixoto, 2012; Winter & O'Raw, 2010) among other factors that might influence students' attitude to achieve higher in mathematics. Therefore, suggesting that the attitude of teachers teaching mathematics needed to be monitored as suggested by (Khun-inkeere, Omar-Fauzee & Othman, 2016) after investigating the performance of public and private primary schools in Thailand. They noted that despite the enormous amount spent by Thai government on public schools, the public students' performance is far below accepted minimum. Also, as discussed by Farah, Fauzee and Daud (2016) policy makers, government and all education stakeholders needed to formulate and implement policies that will improve teachers' education because teachers' quality is based on the education they possessed.

In addition, the study examines the difference in achievement among gender (male and female) of primary six pupils in Songkhla provenience in Thailand. The study presented that there is no statistical significance difference in mathematics achievement among the genders. Therefore, among the subjects observed gender difference is not an issue that influences achievement score in mathematics. As argued by (Mohamed & Waheed 2011), three factors are responsible for differences in students' achievement these are; internal or psychological factors of the students (anxiety, self-efficacy and self-concept, motivation, and experiences at school); and other two external factors namely factors associated with the school, teacher, and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards mathematics, guidance, beliefs); finally factors from the home environment and society (e.g., educational background, parental expectations). Attitudes can be seen as more or less positive. Contrary to the study of (Cole, 1997) where it was posited that male students perform better in mathematics and the studies of (Hembree, 1990) where it is concluded that female students on the other hand has higher achievements than male counterpart in mathematical subject.

Limitation

In order to generalize the findings of this study, as per to the whole of Thailand more investigations in other provenience is as well encouraged. Furthermore, more variables such as peer group study, learning environment, curriculum contents needed more attention from scholars in context of Songkhla provenience of Thailand.

Conclusion

This study reveals the empirical relationship between students' attitude and their achievement in mathematics in Sonklha province of Thailand. Although, previous findings posited similar results; however, this study conclude that factors such as conducive learning environment, technologies such as LCD projector that makes learning to be fun, which can at the same time increase students' motivation should be put in place in schools in Thailand as this will have direct impact on their performance.

Further findings from this study does shows that the students' achievement can be improved if and only if they can perceive the importance of mathematics (value) this will automatically boost their self-confidence. In order to achieve this, the Thai ministry of education and all policy makers have to look deep into reforming the mathematics curriculum so that the students can relate what they learnt in class to their real environment (practical application). Perhaps, a longitudinal study over a period of time should be conducted on the future research. Thus, a comparative study at different type of teaching pedagogy is employed in Southern Thailand.

By this, it is hoped that their self-confidence, value motivation and they will as well be enjoying the class. In overall sense, their attitude towards learning mathematics will be improved, and this will automatically improve the student's achievement.

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