STUDENTS' ATTITUDES TO LEARNING MATHEMATICS WITH TECHNOLOGY IN RURAL SCHOOLS IN SABAH

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ABSTRAK

Sikap Murid Terhadap Pembelajaran Matematik Dengan Menggunakan Teknologi Di Sekolah Luar Bandar Di Sabah

Kajian ini dijalankan bertujuan untuk mengenal pasti sikap murid sekolah menengah terhadap pembelajaran matematik dengan menggunakan teknologi di sekolah luar bandar di Sabah. Dalam kajian ini, teknologi yang diberi penekanan ialah komputer. Kajian ini melibatkan 17 sekolah menengah di Sabah. Sekolah-sekolah ini merangkumi sekolah bandar dan sekolah luar bandar. Seramai 633 orang pelajar daripada Tingkatan Empat, Tingkatan Dua dan Tingkatan Satu telah dipilih secara rawak sebagai responden kajian. Dua jenis statistik telah digunakan iaitu statistik deskriptif dan statistik inferensi untuk menganalisis data yang dikumpul. Keboiehpercayaan instrumen kajian telah dianalisis dengan menggunakan *Reliability Analysis* dalam perisian *Statistical Package for Social Science (SPSS) 13.0 for Windows*. Berdasarkan analisis yang dilakukan dengan menggunakan statistik deskriptif seperti kekerapan dan peratusan, didapati bahawa hanya 13.0% murid daripada sekolah luar bandar mempunyai sikap yang positif terhadap pembelajaran Matematik dengan menggunakan teknologi manakala terdapat 21.5% murid daripada sekolah bandar mempunyai sikap yang positif terhadap pembelajaran Matematik dengan menggunakan teknologi. Hasil pengujian hipotesis dengan menggunakan ujian-t menunjukkan bahawa terdapat perbezaan yang signifikan ($t=-2.424$, $df=543$, $p<0.05$) dari segi sikap murid terhadap pembelajaran Matematik dengan menggunakan teknologi di antara sekolah luar bandar dengan sekolah bandar. Murid daripada sekolah bandar mempunyai keyakinan yang lebih tinggi dari segi keyakinan dengan teknologi (*Confidence with Technology*) berbanding dengan murid daripada sekolah luar bandar. Di samping itu, hasil analisis kajian juga menunjukkan bahawa tidak terdapat perbezaan yang signifikan dari segi sikap murid terhadap pembelajaran Matematik dengan menggunakan teknologi berdasarkan jantina, aliran murid dan tingkatan. Lima konsep utama yang diukur dalam kajian ini iaitu sikap terhadap pembelajaran Matematik dengan menggunakan teknologi, keyakinan dengan teknologi, keyakinan Matematik, keterlibatan afektif dan keterlibatan tingkah laku telah dibuktikan mempunyai korelasi antara satu sama lain.

ABSTRACT

Students' Attitudes To Learning Mathematics With Technology in Rural Schools In Sabah

The purpose of this study was to determine secondary schools students' attitudes to learning Mathematics with technology in rural schools in Sabah. In this study, the focus of technology is computer. This study involved 17 secondary schools in Sabah. These schools were rural schools and non rural schools. A total of 633 students from form 4, form 2 and form 1 were chosen randomly as respondents of this study. Descriptive statistics and inferential statistics were used to analyse the collected data. The realibility of the instrument was analysed by using Realibility Analysis in the Statistical Package for Social Science (SPSS) 13.0 for windows software. According to the analysis performed by using descriptive statistics such as frequency and percentage, it is discoverd that only 13.0% of students from rural schools possessed positive attitude to learning Mathematics with technology whereas 21.5% of students from non rural schools possessed positive attitude to learning Mathematics with technology. Results of hypothesis testing by using T test has indicated that there is significant difference ($t=-2.424$, $df=543$, $p<0.05$) in students' attitudes to learning Mathematics with technology between rural schools and non rural schools. Students from non rural schools possessed higher confidence with technology compared to students from rural schools. Besides, results of analysis also showed that there is no significant difference in students' attitudes to learning Mathematics with technology based on gender, streaming and level of schooling. Five key concepts which were measured in this study i.e. attitude to learning Mathematics with technology, confidence with technology, Mathematics confidence, affective engagement and behavioural engagement were proven to have correlations among each other.

CONTENT

CHAPTER 1

INTRODUCTION

1.1 Introduction

Technology advancement has made teaching and learning mathematics easier nowadays. In the year 2003, the implementation of teaching science and mathematics in English has given a golden opportunity for teachers and students in schools to expose to the use of technology for the above purpose. Under this policy, most of the science and mathematics teachers are given notebooks, LCD projector and teaching courseware to support the teaching and learning activities.

"The mathematics curriculum for secondary school alms to develop individuals who are able to think mathematically, and apply mathematical knowledge effectively and responsibly in solving problems and making decisions; and face challenges in everyday life brought about by the advancement of science and technology" (retrieve online http://www.moe.gov.my/bpk/index.php?option=com_wrapper&Itemid=66). Many educational technologies have been developed for the purpose of teaching and learning. One of the important inventions is computer. The capability of computer to do multi and complicated tasks has leaded us to use it for education purposes.

1.2 Research Background

According Suhadi (1999), mathematics is always regarded as a subject which is boring, burden and scary. Students tend to memorise the necessary formulas and steps in order to obtain good results in examination. Abidin (2005) stated that memorising formulas without understanding is regarded as low level of learning. A research done by Blackett and Tall (1991), had indicated that the versatile learning of trigonometry using interactive computer graphics would lead to a

greater improvement compared to conventional teaching methods. In this research, computer was used so that students could focus on the changes of acute angle in a triangle when the lengths of the sides of triangles changed. According to Blackett and Tall (1991), the ability to use computer to carry out certain arduous constructions while the child can focus on specific relationships is known as the *principle of selective construction.*

Simmons (1993) stated that computer can be used to enrich the learning process of mathematics. The use of computer for learning purposes will encourage the learner to be independent. Nevertheless, the use of teaching aids in Malaysia which involves multimedia technology are still limited when compared to developed countries such as USA and Japan (Norhashim, Mazanah and Rose Alinda, 1996).

1.3 Research Questions

1.3.1 What is the attitude of students to learning mathematics with technology?

1.3.2 Is there any significant difference in students' attitudes to learning mathematics with technology based on categories of schools?

1.3.3 Is there any significant difference in students' confidence of in technology based on categories of schools?

1.3.4 Is there any significant difference in students' attitude to learning mathematics with technology based on gender?

1.3.5 Is there any significant difference in students' attitude to learning mathematics with technology based on streaming?

1.3.6 Is there any significant difference in students' attitudes to learning mathematics with technology based on the level of schooling?

1.3.7 Is there any correlation between the five key concepts (attitude to learning mathematics with technology (MT), confidence with technology (TC), mathematics confidence (MC), affective engagement (AE) and behavioural engagement (BE)) measured?

1.4 Research Objectives

The main purpose of this research is to investigate students' attitudes to learning mathematics with technology in secondary schools of Sabah. Specifically, this research is conducted to achieve the following objectives:

1.4.1 Determine students' attitudes to learning mathematics with technology.

1.4.2 Determine whether there is significant difference in attitude of students to learning mathematics with technology based on school category.

1.4.3 Determine whether there is significant difference in students' confidence with technology based on school category.

1.4.4 Determine whether there is significant difference in students' attitude to learning mathematics with technology based on gender.

1.4.5 Determine whether there is significant difference in students' attitude to learning mathematics with technology based on streaming.

1.4.6 Determine whether there is significant difference in students' attitude to learning mathematics with technology based on level of schooling.

1.4.7 Determine whether there is any correlation between the five key concepts (attitude to learning mathematics with technology (MT), confidence with technology (TC), mathematics confidence (MC), affective engagement (AE) and behavioural engagement (BE)) measured.

1.5 Research Hypothesis

The null hypothesis, H_0 involved in this research is as follows:

H_{01}: There is no significant difference in students' attitudes to learning mathematics with technology based on school category.

H_{02}: There is no significant difference in students' confidence with technology based on school category.

H_{03}: There is no significant difference in students' attitudes to learning mathematics with technology based on gender.

H_{04}: There is no significant difference in students' attitudes to learning mathematics with technology based on streaming.

H_{05}: There is no significant difference in students' attitudes to learning mathematics with technology based on level of schooling.

H_{06}: There is no relationship between the five key concepts (attitude to learning mathematics with technology (MT), confidence with technology (TC), mathematics confidence (MC), affective engagement (AE) and behavioural engagement (BE)) measured.

1.6 Research Significance

This research is to determine the attitude of students to learning mathematics with technology. Since 2003, Malaysia government has encouraged teachers to use technology for the purpose of teaching and learning mathematics. Many researchers have shown the advantages of using technology in teaching and learning mathematics therefore this research should be done in order to know the attitude of student to learning mathematics with technology.

Specifically, we also try to investigate whether there is difference in attitude between students from rural schools and students from non rural schools. Besides, we also try to investigate the attitude to learning mathematics with technology based on a few variables such as gender, streaming and level of schooling. Looking from the perspective of equity in education, this research will provide some important informations whether students are benefited from educational technology based on school category, gender, streaming and level of school.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, certain key concepts will be defined. A brief systematic literature review will be done. A model will be discussed to show the possible relationships of a few key concepts with attitude to learning mathematics with technology.

2.2 Concept Definition

2.2.1 Attitudes towards use of technology for learning mathematics

According to Vale and Leder (2004), "attitude to computer-based mathematics" was defined as the degree to which students perceive that the use of computers in mathematics provides relevance for mathematics, aids their learning of mathematics and contributes to their achievement in mathematics. Galbraith and Haines (1998) used the term "computer and mathematics interaction" for a similar construct. In this research we employ the meaning which is closer to that of Vale and Leder (2004) than Galbraith and Haines (1998).

2.2.2 Confidence with Technology

"Students' attitudes to technology (in the case of computer)" was defined as the students' perceptions of their achievement and their aspiration to achieve in these disciplines.(Vale and Leder, 2004). Galbraith and Haines (1998) defined this construct as a kind of self–assured in operating computers, believe they can master computer procedures required of them.

2.2.3 Mathematics Confidence

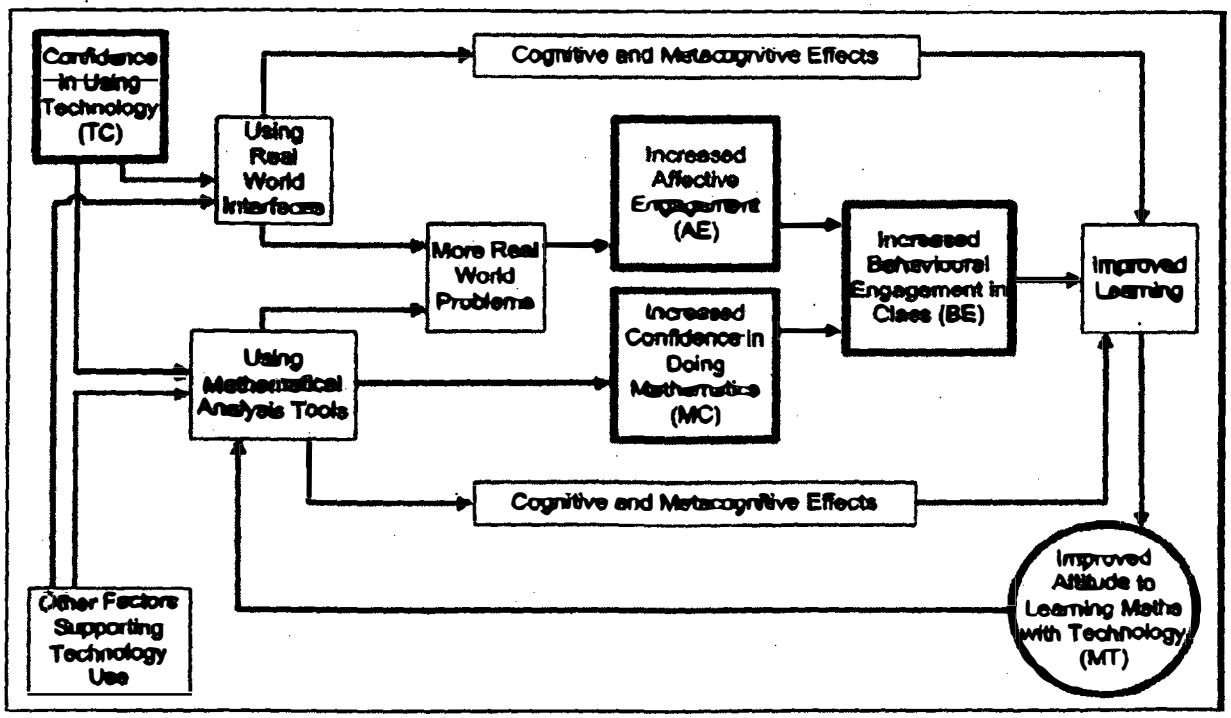
Vale and Leder (2004) see students' attitude to mathematics as students' perceptions of their achievement and their aspiration to achieve in mathematics. Galbraith and Haines (1998) view this construct as evidenced by students who believe they obtain value for their effort, looking forward to get good results, not worry about learning difficult topics and feel good about mathematics as a subject. In this research, we defined this construct as student's perception of their ability to get good results and their assurance that they are able to handle difficulties in mathematics.

2.2.4 Affective and Behavioural Engagement

In Pierce et al (2007), engagement is stated as multifaceted with three components: behavioural engagement, emotional engagement and cognitive engagement. Behavioural engagement is defined as positive conduct at school, involvement in learning academic tasks and participation in school-related activities. Emotional engagement is defined as affective reaction to school and classroom activities. Cognitive engagement is defined as cognition and strategic learning. In this research, we will examine how students feel about the subject (affective engagement in this research) and how they behave in learning the subject (behavioural engagement in this research).

2.3 Model

Figure 2.1 Illustration of hypothesized affective channel for technology use to improve mathematics learning (Pierce et al, 2007)



Looking at the centre row of boxes in Figure 2.1, Pierce et al (2007) hypothesized that information technology in the classroom can enable more real world problem solving. Based on Figure 2.1, it is hypothesized that using real world interfaces and using mathematical analysis tools will enable students to solve more real world problems and hence will increase affective engagement. Using mathematical analysis tools will take away some computation burden from students and hence will increase confidence in doing mathematics. The increase of affective engagement and confidence in doing mathematics will lead to an increase of behavioural engagement in class. Finally this will improve learning in classroom. When students can see the benefits of using technology then it will improve their attitude to learning mathematics with technology.

2.4 Past Researches

According to Rosas et al (2003) and Kenneth (1996), through the use of technologies in the classroom, there is evidence of a relationship among computer-supported recreational activities, positive attitudes towards mathematics, improvement in mathematical learning and student performance. According to Jonanssen and Carr (2000), technology can be used to support the deep reflective thinking that is necessary for meaningful learning. According to Brandt (1997), the use of computers can be utilized as a new technological support for the visualization of abstract concepts through computer-generated virtual representations, allowing for the generation of mental models of the concept.

As noted by Henderson and Landesman (1992), a significant importance is given to the motivational components in the learning experience of mathematics. According to Usun (2004), nowadays, computers which are seen as the most effective interactive device and most effective individual learning technology entered to educational systems and compose new approaches to school systems and learning process, developed new dimensions to existence models supplying information transfer.

According to Monaghan (1996), computers not only introduce new areas of mathematics but bring with them new ways of thinking about mathematics. Using information technologies effectively at mathematics education is a subject that commonly discussed (Cockcroft, 1982).

According to Gabriel and Giberto (2004), the use of Interactive Instructors of Recreational Mathematics (IIRM)-based electronic learning environment has positive motivation to the students' attitude toward mathematics. Most of the students felt comfortable using multiuser games combined with instant messaging tool in classroom.

Based on C.K. Chong et al. (2005) study, 49.5% mathematics teachers use teaching courseware in class, 40.5% used ICT as presentation tools, 8.1% used ICT as a graphical visualising tool, 6.3% used ICT as an online demonstration tool and 3.6% used ICT for other purposes in classroom. The result showed that teachers seldom integrate ICT in teaching mathematics. Mathematics teacher is the main factors in how technology is used in classroom. Hence school administrators should encourage mathematics teacher widely use ICT to enhance their teaching.

The Mathematics and Technology Attitude Scale (MTAS) is developed by Pierce, Stacey and Barkatsas (2007). It was used to examine five affective variables relevant to learning mathematics with technology in middle secondary students. The five subscales are mathematics confidence (MC), confidence with technology (TC), attitude to learning mathematics with technology (MT), affective engagement (AE) and behavioural engagement (BE).

Pierce, Stacey and Barkatsas (2007) found out that confidence in using technology, attitude to learning mathematics with technology and affective and behavioural engagement contribute to the effectiveness of learning processes. Besides, students who have positive attitudes toward learning mathematics with technology overcome initial difficulties by using mathematics computer tools to explore and develop their conceptual understanding.

Literature on student attitudes when learning mathematics with computer tools shows that the idea of attitude can be defined in a variety ways (Galbraith & Haines, 1998; Hannula, 2002; Ruffell & Allen, 1998). According to relevant literature, factors that play rule on students' motivation of using technology for learning are gender, previous experience, grade level and content area of interest.

Research on the role of gender has contradictory results on students' attitude towards learning with technology. According to Temple & Lips (1989), there were no differences in personal interest and enjoyment of computers among males and females. However, Barkatsas, Kasimatis & Vasilis (2009) reported that males are expressed more positive views towards mathematics and more positive views towards the use of technology in mathematics, compared to females.

Based on research done by Gómez-Chacón and Haines (2008), they discovered that there was a low correlation between mathematics and computer attitudes. Besides, they found out that in the learning of mathematics with computers there was a strong relationship with computer attitudes than with mathematics attitudes.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is a very important part in the research process. It can ensure all the research objectives will be achieved by using appropriate data collection methods. In this section, the method of sampling and the instrument for data collection will be discussed. Besides this, the rationale to employ such instrument will also be explained. The instrument used for data collection is the MTAS (Mathematics and Technology Attitude Scale) questionnaire which is developed by Pierce, Stacey and Barkatsas (2007). In general, these are two types of data can be collected in social science research. Both types of data have strength and weakness. Quantitative data is suitable for large scale of research and has greater power for generalization. The qualitative data is suitable for research where we wish to explore the reason behind a phenomenon to occur. This can enable us to investigate a phenomenon in deep. There is no perfect research in this world but these two types of data can eventually support each other to build up a good research. Therefore the nature and the purpose of research will determine what kind of data that you need to collect in order to answer the research questions.

3.2 Research Approach

This is a quantitative research. Only one instrument is used in this research which is the MTAS questionnaire. The questionnaire is distributed to the students during school days. Researcher will distribute the questionnaire to the randomly selected students during the allocated time. A brief explanation will be conducted so that every student is clear with the instruction in the questionnaire. Rural secondary schools are the main target group of this research.

3.3 Research Location

This research is conducted on 17 secondary schools in Sabah. The schools were chosen based on convenience sampling so that the researchers can reach the involved schools easily. Majority of the respondents were secondary form 4 students. There were also some form 1 and form 2 students who responded to this questionnaire. The secondary schools in Sabah are categorised as rural school and non rural school based on their location. Data was collected from some non rural schools to determine whether there is a significant difference in attitude towards learning mathematics with technology when compared to the rural schools' students.

3.4 Population dan Sampling

According Chua Yan Piaw (2006), sampling is the process of choosing a quantity of subjects from a population to be the research respondents. The quality of research depends muchly on research sampling. The Central Limit theorem states that, any random sample with size n from any population will have a distribution almost normal for $n \geq 30$. Therefore the size of sampel chosen must be at least 30 so that it will not violate the normality assumption. Beside that, the normality of data can also be examined by using the Kolmogorov –Smirnov test. There are two types of sampling in social science research which are probability sampling and non probablity sampling. Probability sampling is a kind of sampling where all the subjects in a population will have an equal likely chance to be selected as a respondent. In the other hand, non probability sampling is any sampling method where not all the subjects will have a chance to be selected. In general, this research has employed the convenience sampling method and purposive sampling method. The chosen schools are those can easily access by the researchers and at the same time are categorised as rural schools. 17 secondary schools were chosen and around 500 students are involved in this research.

3.5 Research Instrument

The instrument for this research is MTAS (Mathematics Technology Attitude Scale) questionnaire which is adapted from Pierce et al. (2007). In this research, the technology that we will focus is computer or notebook. Five affective variables relevant to learning mathematics with technology are measured using the MTAS questionnaire. The subscales measure attitude to learning mathematics with technology (MT), behavioral engagement (BE), confidence with technology (TC), affective engagement (AE) and mathematics confidence (MC). The MTAS questionnaire is used as a tool for data collection because it posseses high realibility and validity. The key concept for every affective variable is already discussed in section 2.2 of chapter 2. There are two sections in this instrument. Part A is regarding respondent demography whereas part B is the MTAS items. The total number of items in part A is 5 items and part B is 20 items. In part B of the MTAS questionnaire, item 1 to 4 were used to measure the behavioral engagement (BE) and item 13 to 16 were used to measure affective engagement (AE). Item 5 to 8 were used to measure confidence with technology (TC) and item 9 to 12 were used to measure mathematics confidence (MC). Lastly, item 17 to 20 were used to measure attitude to learning mathematics with technology (MT).

This instrument is considered appropriate for this research because it is easy to administer and the estimated time needed to complete the questionnaire is only around 15-20minutes. The responses given in the MTAS questionnaire are quantified. For item 1 to item 4, the range of coding for the response will be from 1 to 5 with 1 indicating "Hardly ever" and 5 indicating "nearly always". For item 5 to item 20, the range of the response is also from 1 to 5 with 1 indicating "strongly disagree" and 5 indicating "strongly agree".

3.6 Realibility and Validity of Instrument

In terms of validity, this MTAS instrument was sent to expert in this field for validation. In terms of reliability, we used the Alpha Cronbach method to determine its reliability. Based on the pilot test conducted on 36 form 4 students at a secondary school in Sabah, the Alpha Cronbach coefficients for the five key concepts measured in this research were obtained. Please refer to the Table 3.1 below.

Table 3.1: Alpha Cronbach coefficient for key concepts

Key Concepts	Coefficient of Alpha Cronbach
Attitude to learning mathematics with technology (MT)	0.913
Confidence with technology (TC)	0.836
Mathematics confidence (MC)	0.838
Affective engagement (AE)	0.688
Behavioural engagement (BE)	0.695

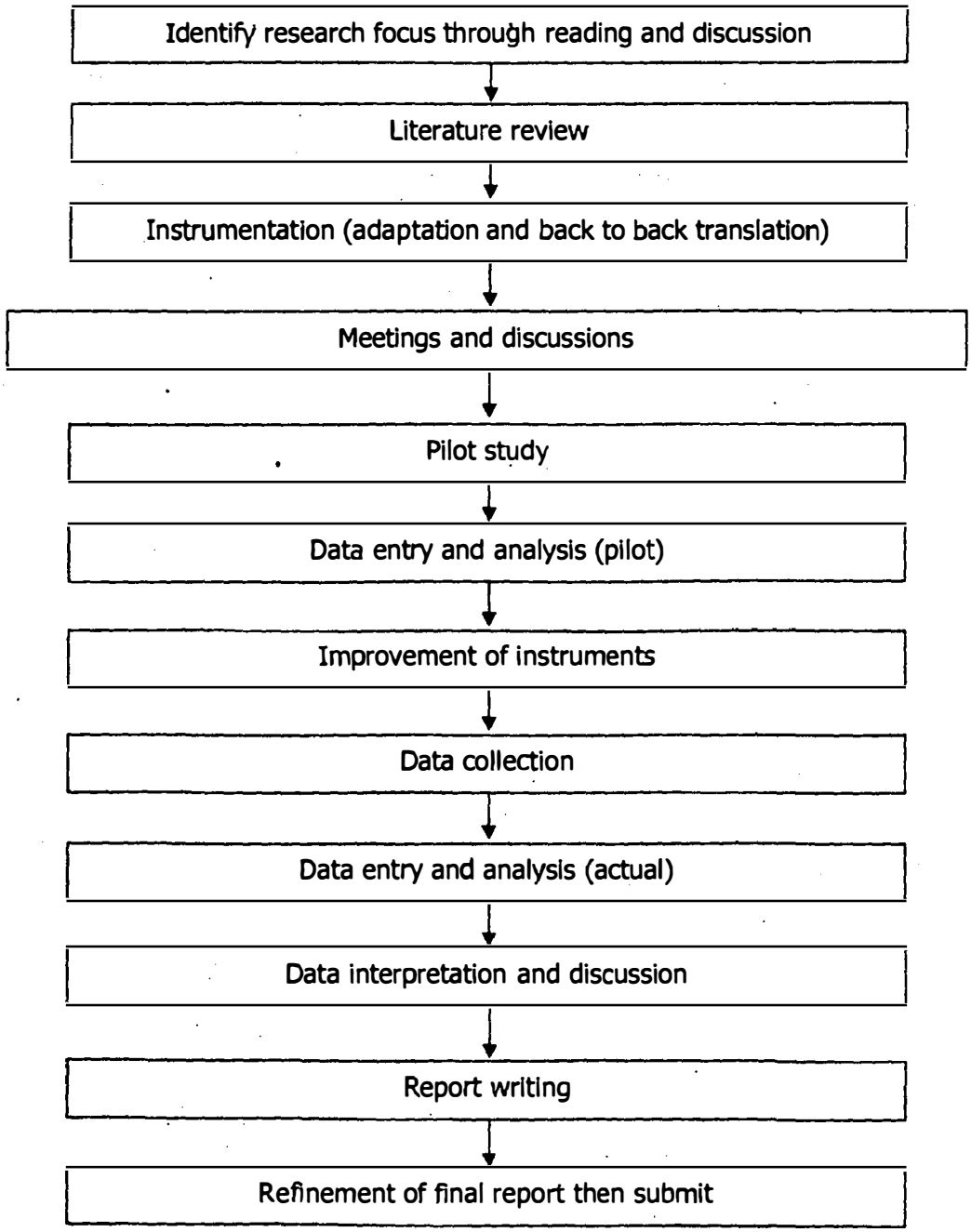
The overall value of Alpha Cronbach coefficient for the MTAS questionnaire is 0.830. In general, when the value of Alpha Cronbach coefficient is over 0.60 then the instrument is considered as realible.

3.7 Pilot Test

A pilot test is conducted in order to examine the reallbility and administerbllity of the MTAS questionnaire. 36 secondary students were involved in this pilot test. We discovered that the students need around 15 minutes only to complete the MTAS questionnaire.

3.8 Research Procedure

Figure 3.1: Research Chart



3.9 Research Analysis

All the data obtained from this research will be analysed by using SPSS 13 software (Statistical Package for Social Science). The MTAS subscale scores can be calculated by simple addition of the responses for the same factor. Maximum possible score for each factor is 20 and minimum score is 4. In this research, we consider scores of 17 and above to be high indicating very positive attitude to that factor. A score of 13-16 is consider as moderately high and a score of 12 or below to be low, indicating a neutral or negative to that factor.

CHAPTER 4

RESEARCH FINDINGS

4.1 Introduction

In this section, the data analysis will be presented. The collected data were the responses from students in different schools in Sabah. Descriptive statistics and inferential statistics are used to analyse the collected data. The responses given in the MTAS questionnaire are quantified.

The MTAS subscale scores are calculated by simple addition of responses. The maximum score for each subscale is 20 and minimum score is 4. Each subscale comprises of 5 items. Inferential statistics and descriptive statistics will be used to answer the relevant research questions.

4.2 Demography of Respondents

Based on the categories of school, the respondents will comprised of students from secondary rural schools and students from secondary non rural schools. Majority of the respondents were form 4 students. Some form 1 and form 2 students also have participated in this research. The total respondents are 633. Based on Table 4.1, there are only 620 respondents involved in this research because we have some missing data.

Table 4.1: Demography of Respondents

School Category	Male	Female	Total
Rural Secondary School	95	140	235

Non Rural Secondary School	173	212	385
Total	268	352	620

4.3 Data Analysis

Only one instrument was used in this research which is the MTAS questionnaire. There are 5 key concepts being measured by using the MTAS questionnaire. The 5 key concepts are mathematics confidence (MC), confidence with technology (TC), attitude to learning mathematics with technology (MT), affective engagement (AE) and behavioural engagement (BE).

4.3.1 Response Analysis of MTAS Questionnaire

The responses given in the MTAS questionnaire are quantified. Maximum possible score for each factor or key concept is 20 and minimum score is 4. In this research, we consider scores of 17 and above to be high indicating very positive attitude to that factor. A score of 13-16 is consider as moderately high and a score of 12 or below to be low, indicating a neutral or negative to that factor. For item 1 to item 4, the range of coding for the response will be from 1 to 5 with 1 indicating "Hardly ever" and 5 indicating "nearly always". For item 5 to item 20, the range of response is also from 1 to 5 with 1 indicating "strongly disagree" and 5 indicating "strongly agree". Table 4.2 shows the analysis of response of MTAS questionnaire.

Table 4.2: Response Analysis of MTAS Questionnaire

Bil.	Item	Number of response				
		1	2	3	4	5
1	I concentrate hard in mathematics.[BE]	1	20	278	236	86
2	I try to answer questions the teacher asks.[BE]	11	94	293	153	71
3	If I make mistakes, I work until I have corrected them.[BE]	5	90	257	194	72
4	If I can't do a problem, I keep trying different ideas.	22	97	267	176	59

	[BE]					
5	I am good at using computers.[TC]	8	20	277	233	83
6	I am good using things like VCRs, DVDs, MP3s, and mobile phones.[TC]	3	17	99	294	207
7	I can fix a lot of computer problems.[TC]	43	145	344	68	19
8	I can master any computer language needed for school.[TC]	50	156	313	74	23
9	I have a mathematical mind.[MC]	23	76	359	138	24
10	I can get good results in mathematics.[MC]	13	58	336	165	43
11	I know I can handle difficulties in mathematics.[MC]	8	41	238	268	62
12	I am confident with mathematics.[MC]	6	28	272	238	74
13	I am interested to learn new things in mathematics.[AE]	4	25	119	343	128
14	In mathematics you get reward for your effort.[AE]	14	65	218	263	56
15	Learning mathematics is enjoyable.[AE]	9	19	160	296	132
16	I get a sense of satisfaction when I solve mathematics problems. [AE]	1	9	59	270	280
17	I like using computers for mathematics.[MT]	25	116	268	143	63
18	Using computers in mathematics is worth the extra effort.[MT]	25	63	268	186	78
19	Mathematics is more interesting when using computers.[MT]	30	78	241	163	108
20	Computers help me learn mathematics better.[MT]	30	60	261	164	106

Table 4.3: Response Analysis based on percentage

Bil.	Item	Percentage for each response				
		1	2	3	4	5
1	I concentrate hard in mathematics.[BE]	0.2	3.2	44.8	38.0	13.8
2	I try to answer questions the teacher asks.[BE]	1.8	15.1	47.1	24.6	11.4
3	If I make mistakes, I work until I have corrected them.[BE]	0.8	14.6	41.6	31.4	11.7
4	If I can't do a problem, I keep trying different ideas. [BE]	3.5	15.6	43.0	28.3	9.5
5	I am good at using computers.[TC]	1.3	3.2	44.6	37.5	13.4
6	I am good using things like VCRs, DVDs, MP3s, and mobile phones.[TC]	0.5	2.7	16.0	47.4	33.4
7	I can fix a lot of computer problems.[TC]	6.9	23.4	55.6	11.0	3.1
8	I can master any computer language needed for school.[TC]	8.1	25.3	50.8	12.0	3.7
9	I have a mathematical mind.[MC]	3.7	12.3	57.9	22.3	3.9
10	I can get good results in mathematics.[MC]	2.1	9.4	54.6	26.8	7.0
11	I know I can handle difficulties in mathematics.[MC]	1.3	6.6	38.6	43.4	10.0
12	I am confident with mathematics.[MC]	1.0	4.5	44.0	38.5	12.0

13	I am interested to learn new things in mathematics.[AE]	0.6	4.0	19.2	55.4	20.7
14	In mathematics you get reward for your effort.[AE]	2.3	10.6	35.4	42.7	9.1
15	Learning mathematics is enjoyable.[AE]	1.5	3.1	26.0	48.1	21.4
16	I get a sense of satisfaction when I solve mathematics problems. [AE]	0.2	1.5	9.5	43.6	45.2
17	I like using computers for mathematics.[MT]	4.1	18.9	43.6	23.3	10.2
18	Using computers in mathematics is worth the extra effort.[MT]	4.0	10.2	43.2	30.0	12.6
19	Mathematics is more interesting when using computers.[MT]	4.8	12.6	38.9	26.3	17.4
20	Computers help me learn mathematics better.[MT]	4.8	9.7	42.0	26.4	17.1

Figure 4.1: Attitude to learning mathematics of respondents

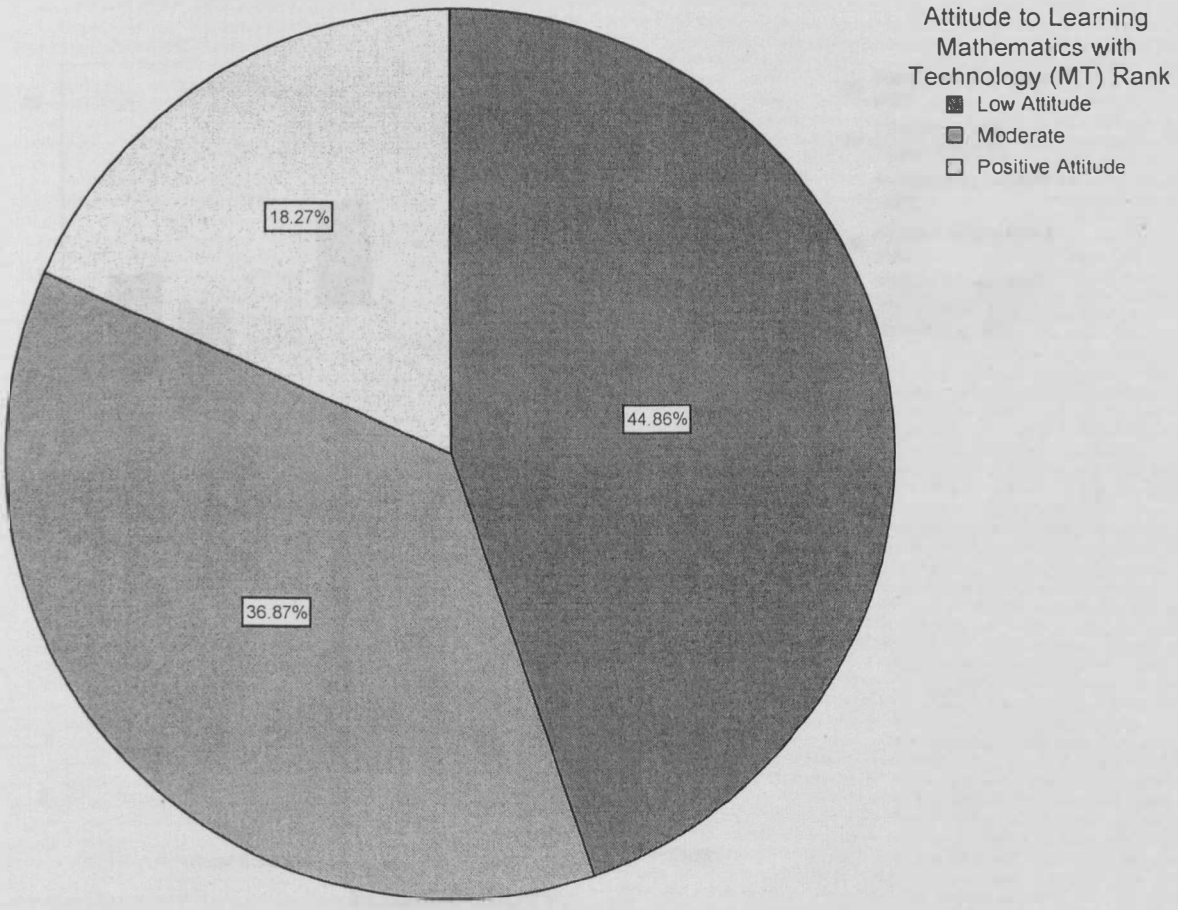


Table 4.4: Attitude to learning mathematics with technology based on category of school

School Category * Attitude to Learning Mathematics with Technology (MT) Rank Crosstabulation

			Attitude to Learning Mathematics with Technology (MT) Rank			
			Low Attitude	Moderate	Positive Attitude	Total
School	Rural Schools	Count	109	92	30	231
		% within Kategori Sekolah	47.2%	39.8%	13.0%	100.0%
	Non-rural Schools	Count	166	134	82	382
		% within Kategori Sekolah	43.5%	35.1%	21.5%	100.0%
Total		Count	275	226	112	613
		% within Kategori Sekolah	44.9%	36.9%	18.3%	100.0%

Figure 4.2: Responses based on key concepts