A STUDY ON ATTITUDE OF STUDENTS TOWARDS STATISTICS IN UiTM KEDAH

RESEARCH MANAGEMENT INSTITUTE (RMI)
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MALAYSIA

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WAN SITI ESAH CHE HUSSAIN

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Contents

1. Letter of Report Submission

Tarikh: 3 September 2012
No Fail Projek: 600-RMI/SSP/DANA 5/3/Dsp (58/2011)

Penolong Naib Canselor (Penyelidikan)
Institut Pengurusan Penyelidikan
Universiti Teknologi Mara
40450 Shah Alam
Selangor Darul Ehsan.

Yang Berbahagia Prof.,

LAPORAN AKHIR PENYELIDIKAN 'A STUDY ON ATTITUDE OF STUDENTS TOWARDS STATISTICS IN UiTM KEDAH'

Merujuk kepada perkara di atas, bersama-sama ini disertakan 2 (naskhah Laporan Akhir Penyelidikan bertajuk 'A Study on Attitude of Students towards Statistics in UiTM Kedah' oleh kumpulan penyelidik UiTM Kedah untuk makluman pihak Prof.

Sekian, terima kasih.

Yang benar,

IDA NORMAYA MOHD NASIR
Ketua
Projek Penyelidikan

2. Letter of Offer (Research Grant)

UNIVERSITI TEKNOLOGI MARA

PEMENANG Anugerah Kualiti Perdana Menteri 2008

Surat Kami : 600-RMI/SSP/DANA 5/3/Dsp (58/2011)
Tarikh : 28 Februari 2011

En Ida Normaya Mohd Nasir
Fakulti Sains Komputer dan Matematik
Universiti Teknologi MARA Kedah
Peti Surat 187
08400 Merbok, Kedah

Y. Brs. Prof./Tuan/Puan

KELULUSAN PERMOHONAN DANA KECEMERLANGAN 02/2011

Tajuk Projek	:	A Study on Attitude of Students Towards Statistics in UiTM Kedah
Kod Projek	:	600-RMI/SSP/DANA 5/3/Dsp (58/2011)
Kategori Projek	:	Kategori F (2011)
Tempoh	:	01 Februari 2011 – 31 Januari 2012 (12 bulan)
Jumlah Peruntukan	:	RM 5,000.00
Ketua Projek	:	En Ida Normaya Mohd Nasir

Dengan hormatnya perkara di atas adalah dirujuk.

2. Sukacita dimaklumkan pihak Universiti telah meluluskan cadangan penyelidikan Y. Brs Prof./tuan/puan untuk membiayai projek penyelidikan di bawah Dana Kecemerlangan UiTM.

3. Bagi pihak Universiti kami mengucapkan tahniah kepada Y. Brs. Prof./tuan/puan kerana kejayaan ini dan seterusnya diharapkan berjaya menyiapkan projek ini dengan cemerlang.

4. Peruntukan kewangan akan disalurkan melalui tiga (3) peringkat berdasarkan kepada laporan kemajuan serta kewangan yang mencapai perbelanjaan lebih kurang 50% dari peruntukan yang diterima.

Peringkat Pertama	20%
Peringkat Kedua	40%
Peringkat Ketiga	40%

5. Untuk tujuan mengemaskini, pihak Y. Brs. Prof./tuan/puan adalah diminta untuk melengkapkan semula kertas cadangan penyelidikan sekiranya perlu, mengisi borang setuju terima projek penyelidikan dan menyusun perancangan semula bajet yang baru seperti yang diluluskan. Sila lihat lampiran bagi tatacara tambahan untuk pengurusan projek.

Sekian, harap maklum.

"SELAMAT MENJALANKAN PENYELIDIKAN DENGAN JAYANYA"

Yang benar

DR. OSKAR HASDINOR HASSAN
Ketua Penyelidikan (Sains Sosial dan Pengurusan)

/RS.

Penolong Naib Canselor (Penyelidikan) : 603-5544 2094/2095
Bahagian Penyelidikan : 603-5544 2097/2091/2101/5521 1462
Bahagian Perundingan : 603-5544 2100/2787/2092/2093
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United State of America

Lecturers, Department of Mathematical Sciences
Universiti Teknologi MARA Cawangan Kedah

and

All the students from UiTM Kedah

4. Report

4.1 Executive Summary

Many undergraduates are required to take the Introductory Statistics course as to satisfy the university's major requirement. These students are usually from non-quantitative major, and they often have difficulty in coping with the course. Many of these students do not realize of their cognitive competence ability as an essential key to succeed in introductory statistics. Since there are typically hundreds of students taking the course, it would be useful if the instructors of the course are able to identify students' weaknesses, and those who are likely to fail the course, will be identified early enough in the term to offer them assistance.

The aim of this study is to assess their attitudes toward statistics. Students' attitudes toward statistics were measured using Survey of Attitudes toward Statistics (SATS) instrument which comprises six dimensions, namely Affect, Cognitive Competence, Value, Difficulty, Effort and Interest. The SATS then was administered to UiTM Kedah undergraduate students who had enrolled in the Introductory Statistics course (QMT181/212/216). Their achievement in SPM Modern Mathematics and Additional Mathematics were also recorded as to examine the impact of the grade on their attitude toward statistics. Descriptive statistics and ANOVA test with $p<0.05$ level of significance were used to analyze the collected data. This study aims to assist lecturer in finding the best teaching methodology in order to improve the learning method of statistics in the classroom.

4.2 Introduction

4.2.1 Background

Malaysia aspires to be a fully developed country by the year 2020. This has been outlined in what is known as Vision 2020. The sixth challenge is that of establishing a scientific and progressive society that is not only a consumer in technology but also a contributor to scientific and technological civilisation of the future. Universiti Teknologi MARA (UiTM) has recognised that the university has to be restructured in order to face new challenges in this era of globalisation and ICT propagation. Under UiTM's restructuring programmes, the university aims to increase the number of full-time students enrolled in science and technology courses to 60% of all students by the year 2015 (UiTM 2004).

It is one of UiTM's objectives to educate Bumiputeras to become professionals of high calibre in the conduct of completing in business, trade, science and technology. UiTM is the largest contributor of Bumiputera professional in Malaysia. Figure 4.1 shows the increasing enrolment of the UiTM students from 2006 to 2010.

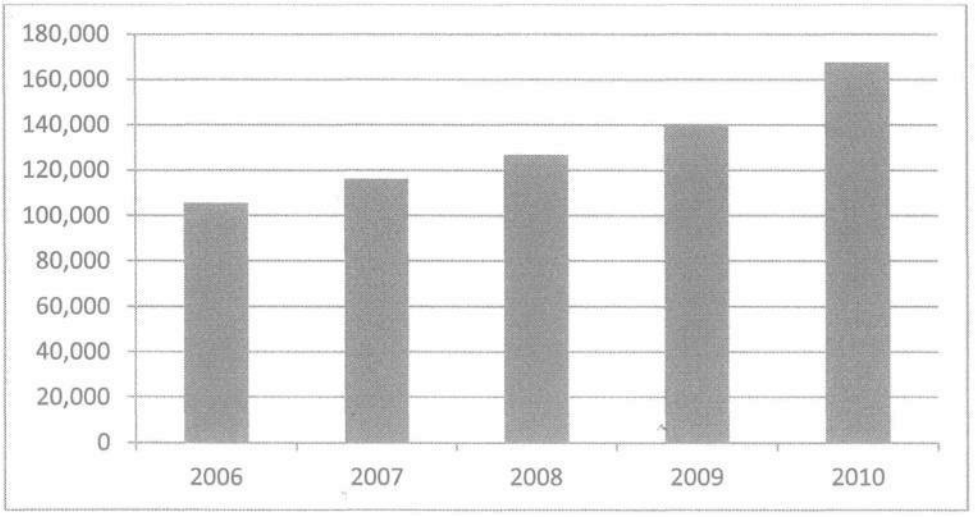


Figure 4.1: Number of Enrolment

4.2.2 Statistics Course in UiTM

Statistics is a structural method in solving a problem and frequently used in various fields including information and communication technology (ICT). This has led to making Statistics among the core subjects in Higher Education Institutes in Malaysia.

Introduction to Statistics and is a core subject provided by Faculty of Computer Sciences and Mathematics (FSKM) which aims to give exposures towards the basic statistical concepts and techniques applicable in research and industry. The course content includes presentation of quantitative data, data description, probability, correlation, simple linear regression and time series analysis. Students are also exposed to statistical packages such as Statistical Packages for Social Sciences (SPSS).

Statistical course is in fact not new to the first year students because they have been given exposures on statistics since Year Six in primary school. They have also taken the subject in matriculation years and Form Six. Through some observations by the academic staff teaching the subject, student absentees throughout the course is something of quite a concern. Due to the technical nature of the subject, the students who missed classes have a risk of falling behind and failing to understand the topics which are mostly related to each other. This phenomenon has seeded some concern among the lecturers. The question is why the result is not satisfactory when they already have some exposures on the subject since their earlier schooling years? Difficulties in understanding the statistics subject is not only due to non-cognitive factors like attitude, perception, interest, expectation and motivation but also influenced by cognitive factors involving student's intellectual capability to do well in the subject. These two factors could obstruct the learning process in statistics and engage the skills in daily tasks. Therefore, a survey to investigate the problem has been conducted in this study. Observation on student's attitude towards the subject was carried out using an instrument called Survey of the Attitudes towards Statistics (SATS), which measures both cognitive and non-cognitive factors.

4.2.3 Objective of the Study

The objectives of this study are:

i. Determine the overall UiTM Kedah students' attitudes toward statistics.
ii. Determine the relationship between attitudes toward statistics and SPM Mathematics results.
iii. Determine the relationship between attitudes toward statistics and SPM Additional Mathematics results.

4.3 Literature Review

4.3.1 Introduction

There are various definitions of the word attitude given by previous researchers. Attitude studies are important to acquire personal feedbacks on a phenomenon. According to Anderson (1994), there are five components in attitude which are emotion, goal, direction, strength and consistency. Each attitude component is divided into positive, neutral and negative. From psychological point of view, attitude is viewed as a mental condition that exists in a person, shaped through experience and will influence a person's reaction towards an object or related phenomenon. Attitude is processed through learning and implicit in nature (Tay Meng Guan, 2003).

4.3.2 Attitude towards Statistics

In this study, student's attitude towards a statistics subject was measured through responses given by students towards a set of statements or items in a specific attitude component. Magnitude of an attitude was measured through their level of agreement or disagreement on each item. A positive attitude is vital to encourage students to get interested in learning a certain subject. This study engages an SATS survey developed by Schau (2003) according to six attitude components which are affective, cognitive capability, value, difficulty, interest and effort.

Affective is a component assessing student's expression towards statistics course. The item used to measure the expression are statements showing student's interest, not feeling threatened, not disappointed, fun and not stressed in solving a statistics problem and in following the course.

The second component in assessing attitude is the cognitive capability, which is student's attitude towards the knowledge and intellectual skill in using the statistics knowledge. The items used to measure this attitude are statements showing students do not having difficulties in understanding the statistics concept based on their way of thinking, have the ability to learn statistics by making least errors in calculation and understand of the formula and statistics concept.

Value is the third component in assessing student's attitude towards a statistics course. This component assesses attitude towards the usefulness, relevance and advantage of statistics for individuals and their professional life. The items used to

assess this attitude are statements showing that statistics is useful, necessary and relevant in their studies, as well as in daily lives and career.

The next component is difficulty, which assesses attitude towards the difficulties in understanding the subject. This includes how easy it is to understand a formula, technical method, and the massive calculation involved in the subject. Other indicators of the component include easiness of the course, low requirement for discipline and least requisite in new way of thinking using statistics.

Interest is a component assessing student's tendency towards the subject. Items used in assessing this attitude is whether or not the student is interested in talking about the related statistical information with other individuals, using statistics, understanding the statistical information and their interest in learning statistics.

Student's effort is also among the components assessed. If the students showed that they have given tremendous effort, they are categorised as having a positive attitude towards statistics. This component is assessed with statements such as student's intention in completing all the assignments, studying hard and attending all lectures in the subject.

Student's attitude and perception on statistics courses require substantial attention because both items give impacts on the teaching and learning process of the subject. Their attitude will also influence their statistical thinking outside of the classroom or in applications for other courses. It also encourages students to take this course at a higher level (Gal. Et al. 1997). In addition, a study on the student's attitude towards the statistics subject is important to encourage student to understand the statistics concept, to improve their skill and to appreciate the knowledge in their daily lives.

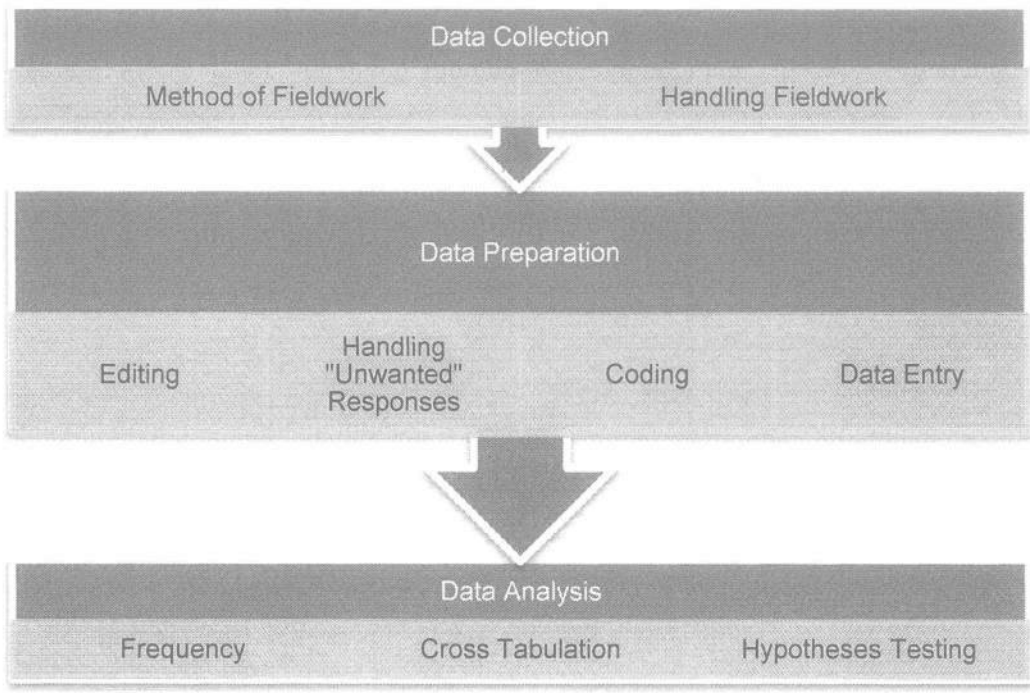
A negative attitude towards this course will be an obstacle in learning the course effectively (Fullerton & Umphrey 2001). Therefore, a study was carried out to identify the attitude of first year students in UiTM Kedah students towards the statistics subject.

4.4 Methodology

4.4.1 Data Collection Method

Data can be collected in a variety of ways including questioning (face to face interview), observation and experiment. In order to conduct the research, both primary and secondary data were used. Figure 3.1 below illustrates the method of data collection, data preparation and data analysis.

Figure 4.2: Method of Data Processing



4.4.2 Instruments

In this study, the attitudes of students are measured using 36 items of SATS© (Statistics Attitudes toward Statistics). This measurement comprises six components of attitudes toward statistics, namely Affect (students' positive and negative feelings in concerning statistics); Cognitive Competence (students' attitude about their intellectual knowledge and skills when have been applied to statistics); Value (attitude about the usefulness, relevance, and worth of statistics in personal and professional life); Difficulty (students' attitude about the difficulty of statistics as a subject); Interest (students' level of individual interest in statistic) and Effort (amount of work used by students to learn statistics). The higher the score indicates, the positive attitude of statistics has been portrayed by the students. Data were collected at the beginning of

the course during the first day of the class. Students were briefly explained on the objective of the study and were informed that the participation was on voluntary basis. Data collection was completed in about 20 to 25 minutes.

4.4.3 Sampling Method

There are many ways of obtaining a sample from the population. Several factors have to be considered when choosing the sample. It is crucial that the sample be a representative sample. It should reflect as closely as possible the relevant characteristics of the population under consideration.

Some commonly used sampling procedures are Simple Random Sampling, Systematics Random Sampling, Cluster Sampling and Stratified Sampling. In this study, the researchers chose to use Stratified Sampling.

The population of the study is limited to students who are taking the Introductory Statistics course (QMT181/212/216) at Universiti Teknologi Mara (UiTM) of Kedah campus. A sample of 213 out of 240 course participants, were responded to the questionnaire from four different programmes namely, Diploma in Accountancy (DIA), Diploma in Banking (DIB), Diploma in Business Studies (DBS), and Diploma in Public Administration (DPA) during July – November 2009 academic session. Table 4.1 and Figure 4.3 represent the demographic characteristics of the participants.

Table 4.1: Programmes and Courses under Study

Programme	Programme Code	Course	Number of Respondents
Diploma in Accountancy	AC110	QMT181	103
Diploma in Banking	BM112	QMT212	27
Diploma in Business Studies	BM111	QMT212	30
Diploma in Public Administration	AM110	QMT216	53

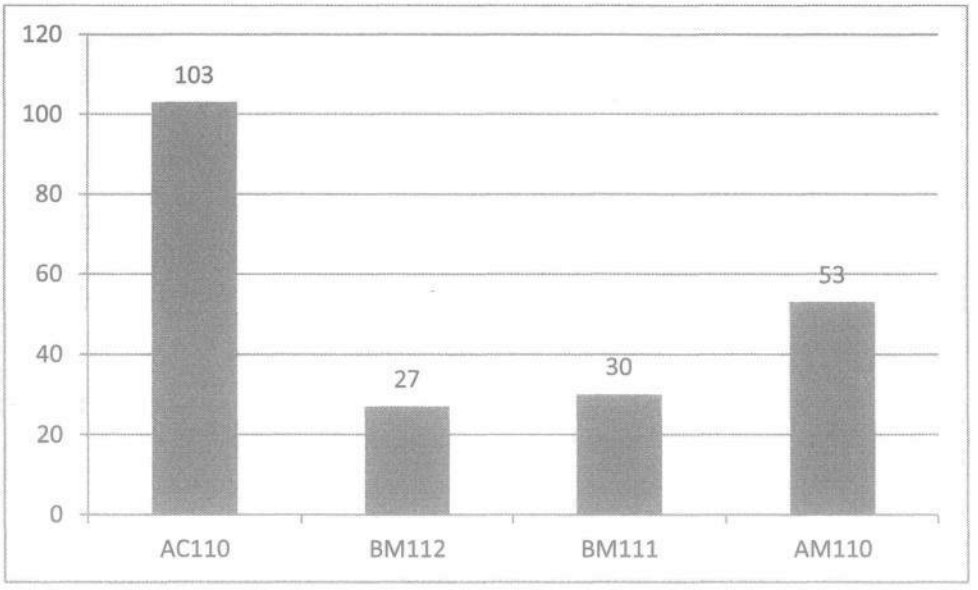


Figure 4.3: Number of Respondents According to Programmes

4.4.4 Data Analysis Technique

The raw data gathered from the questionnaires were analysed using Statistical Package for Social Sciences (SPSS) version 17.

The first level of data analysis was to generate basic statistics including mean, frequency, percentage and cross-tabulation. At the higher level, bivariate correlation analyses were carried out between attitude towards statistics and programmes, gender, SPM Mathematics grades and SPM Additional Mathematics grades.

4.5 Results and Discussion

4.5.1 Introduction

Generally, students who enrolled for introductory to statistics course have positive attitudes toward statistics as it incorporated in their upper secondary school subjects. The assessment of attitudes toward statistics is explained below based on six components such as Affect (students' positive and negative feelings in concerning statistics); Cognitive Competence (students' attitude about their intellectual knowledge and skills when have been applied to statistics); Value (attitude about the usefulness, relevance, and worth of statistics in personal and professional life); Difficulty (students' attitude about the difficulty of statistics as a subject); Interest (students' level of individual interest in statistic) and Effort (amount of work used by students to learn statistics).

4.5.2 Demographic Profile of the Respondents

Table 4.2 shows the demographic profile of the respondents participated in this study. 48.4 percent of the respondents are students from Diploma in Accountancy while 25 percent are students from Diploma in Public Administration. In terms of their past Mathematics performances, 62.8 percent recorded excellent grades (A1 and A2) while 24.8 percent of respondents scores B+ in Modern Mathematics. In the contrary, the achievement for SPM Additional Mathematics is mediocre where 60 percent of the respondents scores between C5 to P7.

Table 4.2: Frequency and Relative Percentage of Demographic Characteristics

Demographic characteristics	Description	Frequency	Relative %
Programme of study	DPA	53	24.9
	DIA	103	48.4
	DIB	27	12.7
	DBS	30	14.1
SPM Modern Mathematics grade	A1	87	41.4
	A2	45	21.4
	B3	39	18.6
	B4	13	6.2
	C5	20	9.5
	C6	6	2.9
SPM Additional Mathematics grade	A1	1	0.5
	A2	9	4.7
	B3	12	6.2
	B4	21	10.9
	C5	30	15.5
	C6	28	14.5
	P7	61	31.6
	P8	25	13.0
	F9	6	3.1

4.5.2 Students Attitudes towards Statistics

In the assessment of students' positive and negative feelings about statistics - Affect, a majority of the respondents or (82%) will like statistics and 66% of them enjoyed taking statistics. On average, almost 50% of the respondents had a positive attitude toward statistics in the Affect component (see Table 4.3).

Table 4.3: Attitudes toward Statistics Based on *Affect* Items

No.	Items	Disagree (%)	Neither disagree nor agree (%)	Agree (%)
3.	I will like statistics.	4.3	14.2	81.5
4.	I will feel secure when I have to do statistics problems.	36.2	38.8	25.0
15.	I will not get frustrated going over statistics tests in class.	19.4	45.7	34.9
18.	I will not be under stress during statistics class.	15.9	36.6	47.4
19.	I will enjoy taking statistics course.	7.3	26.3	66.4
28.	I am not scared by statistics.	34.9	29.7	36.3

	Mean (%) *Affect*	19.7	31.9	48.6

Cognitive Competence is the measurement of students' attitude about their intellectual knowledge and skills when applied to statistics. Majority of the respondents said that they could learn statistics and slightly over 70% said that they will understand statistics equations. On average, 47% of them had a positive attitude toward statistics in the Cognitive Competence component (See Table 4.4).

Table 4.4: Attitudes toward Statistics Based on *Cognitive Competence* Items

No.	Items	Disagree (%)	Neither disagree nor agree (%)	Agree (%)
5.	I will not have trouble understanding statistics because of how I think.	37.9	37.9	24.1
11.	I will have idea of what's going on in this statistics course.	26.7	34.9	38.4
26.	I will not make a lot of math errors in statistics.	36.6	40.9	22.4
31.	I can learn statistics.	3.4	9.9	86.6
32.	I will understand statistics equations.	4.7	20.7	74.6
35.	I will find it easy to understand statistical concepts.	25.4	37.9	36.6
	Mean (%) *Cognitive Competence*	22.5	30.4	47.1

Table 4.5 demonstrates the assessment of attitude about the usefulness, relevance, and worth of statistics in personal and professional life – Value component. 75% of the respondents realized that statistical skills will make them more employable while 72% agreed that statistics is valuable. On average, half of the total respondents had a positive attitude toward statistics in the Value component.

Table 4.5: Attitudes toward Statistics Based on *Value* Items

No.	Items	Disagree (%)	Neither disagree nor agree (%)	Agree (%)
7.	Statistics is valuable.	5.2	22.4	72.4
9.	Statistics should be acquired part of my professional training.	7.3	25.9	66.8
10.	Statistical skills will make me more employable.	2.6	22.0	75.4
13.	Statistics is useful to the typical professional.	12.5	39.7	47.8
16.	Statistical thinking is applicable in my life outside my job.	12.5	40.5	47.0
17.	I use statistics in my everyday life.	27.6	47.0	25.4
21.	Statistics conclusions are often presented in everyday life.	36.6	41.8	21.6
25.	I will have application for statistics in my	13.4	40.5	46.1

	profession.			
33.	Statistics is relevant in my life.	9.9	36.2	53.9
	Mean (%) *Value*	14.2	35.1	50.7

In the assessment of attitudes about difficulty of statistics as a domain, 73% of the respondents perceived that statistics required a great deal of discipline. On average, 37% of the respondents agreed that they were struggling in learning statistics (see Table 4.6).

Table 4.6: Attitudes toward Statistics Based on *Difficulty* Items

No.	Items	Disagree (%)	Neither disagree nor agree (%)	Agree (%)
6.	Statistics formulas are easy to understand.	16.8	50.0	33.2
8.	Statistics is not a complicated subject.	29.3	40.1	30.6
22.	Statistics is a subject quickly learned by most people.	18.1	43.5	38.4
24.	Learning statistics not requires a great deal of discipline.	73.3	23.7	3.0
30.	Statistics do not involve massive computations.	55.6	37.9	6.5
34.	Statistics is not highly technical.	34.1	53.4	12.5
36.	Most people do not have to learn a new way of thinking to do statistics.	34.9	50.9	14.2
	Mean (%) *Difficulty*	37.4	42.8	19.8

4.5.3 Programmes Differences

A one-way between-groups analysis of variance (ANOVA) was conducted to investigate the differences between programmes on six components of attitudes (Affect, Cognitive Competence, Value, Difficulty, Interest and Effort). Table 4.7 indicated that there was a statistically significant difference at the $p<0.05$ level of significance for mean score for Interest and Effort. Despite reaching statistical significance, the actual difference in mean score of Interest and Effort between programmes was moderate. The effect size, calculated using eta-squared was 0.083 and 0.116 respectively, indicating medium effect. Cohen (1988) classified 0.01 as a small effect, 0.06 as a medium effect and 0.14 as a large effect.

Table 4.7: Summary of One-Way ANOVA

Component	F test	p-value	Eta squared
Affect	1.686	0.171	0.024
Cognitive Competence	2.410	0.068	0.033
Value	2.050	0.108	0.029
Difficulty	0.721	0.541	0.010
Interest	6.278	0.000*	0.083
Effort	9.170	0.000*	0.116

*Significant at $p<0.05$ level of significance

Post-hoc comparisons using Tukey HSD reported that DIB's students' perceived lower agreement on Interest and Effort towards the introductory statistics course as compared to other programmes (see Table 4.8 and 4.9).

Table 4.8: Difference in Attitudes toward Statistics Based on *Interest* items

Course (I)	Course (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
DPA	DIA	-0.154	0.143	0.703	-0.525	0.216
	DIB	0.638*	0.200	0.009	0.119	1.157
	DBS	-0.044	0.193	0.996	-0.546	0.456
DIA	DPA	0.154	0.143	0.703	-0.216	0.525
	DIB	0.792*	0.183	0.000	0.318	1.267
	DBS	0.109	0.175	0.925	-0.345	0.564
DIB	DPA	-0.638*	0.200	0.009	-1.157	-0.119
	DIA	-0.792*	0.183	0.000	-1.267	-0.318
	DBS	-0.683*	0.224	0.014	-1.265	-0.101
DBS	DPA	0.044	0.193	0.996	-0.456	0.546
	DIA	-0.109	0.175	0.925	-0.564	0.345
	DIB	0.683*	0.224	0.014	0.101	1.265

* The mean difference is significant at the 0.05 level.

Table 4.9: Difference in Attitudes toward Statistics Based on *Effort* items

Course (I)	Course (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
DPA	DIA	0.027	0.114	0.995	-0.269	0.324
	DIB	0.756*	0.160	0.000	0.341	1.172
	DBS	0.077	0.154	0.959	-0.323	0.478
DIA	DPA	-0.027	0.114	0.995	-0.324	0.269
	DIB	0.729*	0.146	0.000	0.349	1.108
	DBS	0.049	0.140	0.985	-0.314	0.413
DIB	DPA	-0.756*	0.160	0.000	-1.172	-0.341
	DIA	-0.729*	0.146	0.000	-1.108	-0.349
	DBS	-0.679*	0.179	0.001	-1.145	-0.213
DBS	DPA	-0.077	0.154	0.959	-0.478	0.323
	DIA	-0.049	0.140	0.985	-0.413	0.314
	DIB	0.679*	0.179	0.001	0.213	1.145

* The mean difference is significant at the 0.05 level.

4.5.4 National Examination Achievement

In the study of the differences between attitude toward statistics and past academic achievement, analysis of variance (ANOVA) was conducted. An F ratio is calculated, which represents the variance between groups, divided by the variance within the groups. A large F ratio indicates that there more variability between groups than there is within each group.

ANOVA result for the difference of each SATS component and their SPM Mathematics/Additional Mathematics grade are presented in Table 10 and 11. There was a statistically significant difference at the $p<0.05$ level in SPM Modern Mathematics grade and Cognitive Competence (students' attitude about their intellectual knowledge and skills when applied to statistics). However, the actual difference in mean score Cognitive Competence was moderate. The effect size, calculated using eta-squared, was 0.119 (see Table 4.10). Post-hoc comparisons using Tukey HSD test indicated that mean score of Cognitive Competence for student who get grade C6 in Modern Mathematics was differed significantly from other grades. They tend to have lower agreement towards their intellectual knowledge and skills when applied to statistics. However, there were no significant differences in the average SPM Additional Mathematics score across all SATS components (see Table 4.11).

Table 4.10: Summary of One-Way ANOVA (Modern Mathematics)

Component	F test	p-value	Eta-squared
Affect	1.456	0.206	0.034
Cognitive Competence	5.491	0.000*	0.119
Value	1.064	0.381	0.025
Difficulty	0.721	0.608	0.017
Interest	1.954	0.087	0.046
Effort	1.313	0.260	0.031

*Significant at $p<0.05$ level of significance

Table 4.11: Summary of One-Way ANOVA (Additional Mathematics)

Component	F test	p-value	Eta-squared
Affect	1.326	0.233	0.054
Cognitive Competence	1.076	0.382	0.045
Value	1.133	0.343	0.047
Difficulty	0.828	0.579	0.035
Interest	0.904	0.515	0.038
Effort	1.544	0.145	0.063

*Significant at $p<0.05$ level of significance

4.6 Conclusion and Recommendation

4.6.1 Conclusions

The findings of this study reveiled that majority of the students who enrolled for introductory statistics course (QMT181/212/216) have a positive attitude toward statistics. They have learned descriptive statistics in secondary school and it has contributed to the positive attitude toward statistics. Lecturers who teach this subject should take this opportunity to capitalize on students' acceptance toward statistics. These students appreciated the value of statistics and understand that statistical skills will make them more employable. The students also believed that they could learn and understand statistics equations. Therefore, lecturer can use these findings as to uphold the positive attitudes and beliefs among students by designing instructional activities that are essential in real world scenarios. These findings, preferably will enhance students' understanding of issues which are important for them.

4.6.2 Recommendations

The results of this study suggested that lecturer should find out in profoundness of the reasons why DIB students have less agreement on Interest and Effort towards introductory statistics course as compared to other programmes. Through the investigation, probably new strategies could be adopted to improve their interest and effort toward the course. Mvududu (2003) discovered that supportive atmostphere can improve the achievement in a course regardless of the attitude toward the field of statistics.

Furthermore, this study also shed light on the relationship between attitudes and beliefs regarding statistics, and SPM Modern Mathematics grade which indicating that they were not as one in the same of Cognitive Competence component. This study suggested that lecturers who teach this course most probably could find ways to help weak students in Modern Mathematics (especially those who get C6) to improve their attitude about their intellectual knowledge and skills when applied to statistics.

Based on the findings of the research, the researchers wish to make a few recommendations in order that performance in statistics may improve. These recommendations are given from the perspective of parents, educatores and the students themselves. Each of these parties has a role to play in helping students improve their attitude towards statistics.

4.6.2.1 Role of Parents

The extent to which a child is motivated determines the amount of time and energy he/she is willing to spend in the learning process. This is where parents can play an important role in encouraging and motivating their children. This is not sole job of educators. Parents should refrain from pressuring their children and adding stress to an alredy difficult situation.

In Malaysian context, great emphasis is placed on students attending tuition classes apart from going to regular school. This greatly increases the students workload and causes greater strain on the students. Parents, therefore, play an important role as the chief motivators of students. They should be encouraging instead of derisive when their children fail to perform as their expectations.

4.6.2.2 Rule of Educators

Educators play a major rulein training students both at school and at tertiary levels. Classes in UiTM typically have thirty to forthy students. Thus lecturers tend to treat the class as a single unit rather than individual students with separate needs and learning styles. Lecturers who face constraints in regard to time and syllabus content tend to rely on scores obtained from standardised tests to determine student understanding when in fact individual students may be struggling unknown to the lecturer. The following suggestions are meant for educators who play an important role in helping students with negative attitude towards statistics.

i. Educators need to be innovative in their teaching methods to make statistics interesting and fun.
ii. Educators need to devise methods that are constructive and interactive. If students learn best in groups, then educators should incorporate group discussions in the classroom. They should engage students in discussions and encourage students to ask and learn.
iii. Educators must expose students to daily life examples in the teaching and learning statistics. Statistics must be seen to be relevant to daily life. Thus, students from various disciplines and ability can better understand how statistics is related to their field of interest.

iv. Educators must explain concepts underlying various theories rather than use the traditional "talk and chalk" method of teaching.

v. Educators ought to continously read and conduct research to discover new ideas and knowledge that can be disseminated to students.

vi. Educators should implement the latest ICT-based teaching aids in their teaching. Research has proven that the employment of ICT-based teaching aids is necessary to ensure that the teaching statistics as well as easy to understand.

4.6.2.3 Role of Students

i. Students should recognise his/her negative self-talk and change to more positive self-talk.

ii. Since most problems can be solved in more than one way, a student should do statistics in a way that he/she is comfortable with.

iii. If a students works better in a group, he/she should seek out like-minded students in order to form a study group. Study groups should not be too large. Smaller groups will force greater participation from each member of the group.

iv. Students must take advantage of their lecturers' consultation hours and approach them to ask them questions.

v. Students need to prepare before attending class. The relevant part of the textbook or manual must be read before the lecturer. Even if the student does not understand everything that has been read, at least he/she will be better prepared before going to class. The student can also better participate in classroom discussions. The student can also be less afraid if called upon to do board work.

vi. Students should work on as many problems as possible. Begin with exercises with low difficulty level and gradually increase the level of difficulty. Self-confidence will soon develop when students manage to solve statistical problems at manageable levels.

vii. When preparing for tests/examinations, students should not leave studying until the last minutes and then start cramming.