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Factors affecting FTSM students' achievement in statistics course

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Abstract

In learning a statistics course, students are forced to deal with complicated formula which makes them feel under a lot of pressure and find it difficult to understand certain concepts. Previous researches show that Faculty of Information Science and Technology (FTSM) students' achievement is only average, nevertheless their attitude towards this course is generally positive. The question is, doesn't the positive attitude contribute to the students' achievement in the course? What are the other factors which really contribute towards the students' achievement in the statistics course? Based on this inquiry, a research is carried out to investigate the factor(s) which may affect students' achievement in the statistics course. This survey involves first-year students from the 2010/2011 session from the FTSM. The methodology of the survey is using questionnaires. Data collected is analysed using the SPSS software version 18.0. Analysis of research data is made using the chi-squared test. Findings of the research show that demographic factors such as gender and pre-university achievements do not affect the students' achievement. Race, program of study as well as students' entrance qualifications are among the factors which influenced their achievement. Although attitude in general does not influence achievement, affective and cognitive components however, do relate to students' achievement.

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Keywords: Chi-squared test; demographic factors; students' attitude; statistics

1. Introduction

In the present era of globalisation which is very challenging, countries all over the world are taking the field of education more seriously because it plays an important role in producing a country's human resource which is of high quality and good personality. The teaching and learning process in the lecture room is a form of interaction between three important entities namely students, lecturer, and learning materials (Zamri et al., 2009). All three factors are surrounded by the learning environment. The main objective of teaching and learning is for the students to master the learning materials or resources effectively.

A student's mastery of the learning materials could be gauged by measuring his or her achievement (Kamus Dewan, 2002). In general, academic achievement is the result of or transition from something which contains in-

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depth and high level of knowledge. Learning at an institute of higher education is a formal learning orientated to students' achievement which is assessed and endorsed by certain parties, apart from the conferment of a degree to mark the recognition. The goal of an institute of higher education is clear, that is to produce graduates who are both successful in their academic and also spiritual achievements. In general, academic achievement is determined from an individual's level of attainment in a pre-established system of assessment (Othman & Rahmadhaniah, 2010). Their research also finds that achievement is demonstrated through resolution and efficiency obtained and does not necessarily depend on intelligence. In line with that, all the problems which occur during the learning process will encourage an institute of higher learning to make more effort and be more determined in producing excellent human beings. A student's academic achievement is not only influenced by an excellent mind, but also takes into account other factors. Numerous researches on factors that affect students' attainment in various subjects have been done. Based on the research carried out by Noraini (2008), attitude of an interest in education are some of the factors which influence a student's academic achievement.

Statistics is a significant course for a higher level of education. It exposes student to a structural concepts and techniques in generating, analysing, presenting and interpreting data. Due to the importance of this course, students should possess positive attitude towards it. At the university levels, statistics course is often linked to topics on probability, descriptive and inferential statistics. In the learning of statistics course, students deal with complicated formula which make them feel under pressure and difficult to understand certain concepts. The findings of the research on students' attitude towards statistics performed by Noraidah et al. (2011) found that their achievement is only at the average positive level. Statistics course have been introduced to the students as early as their primary six, which are then extended to the matriculation and form six levels, but they still have the attitude of showing no interest in or saying that statistics is difficult and are anxious while learning it as well as having other negative perceptions which make their achievement to become stagnant.

From the problem background above, it is found that students' academic achievement is influenced by a multitude of factors. Thus, the objective of this research is to identify the factors which affect the achievement of students of first year undergraduate programmes of the Faculty of Information Science and Technology, National University of Malaysia, in their statistics course. The programmes are Computer Science (TK), Intelligence System (TC), System Science and Management (TS), Industrial Computing (TR), Information Science (TP) and Multimedia Studies (TH), session 2010/2011.

2. Methodology

This research is an extension of previous researches (Noraidah et al., 2011; Hairulliza et al., 2011) where an attitude survey was carried out on first year students who were undertaking a course on Statistics and Probability in their first semester of the 2010/2011 session. They were asked to answer the questionnaire online after having gone through the course for 4 weeks. The questionnaire was taken from the Survey of the Attitudes Toward Statistics (SATS) instrument, which measures both the students' cognitive and non-cognitive factors. The score for each item is based on the 5-point Likert scale. A few demographic information about the students such as gender, race, the grade of their statistics and CGPA while in Form Six, the matriculation or diploma level from the questionnaire were taken into account in this research. Additional data which is the students' final exam results of the statistics course were obtained from the FTSM academic unit and were analysed at the end of semester 1. Students' statistics achievement refers to the grade obtained in the final examination of 2010. All data collected were analysed using the SPSS for Windows. Descriptive analysis in percentage was used. The chi-squared, χ^2 test was used to identify the relationship between the factors. The hypotheses of the research are to identify;

- The relationship between gender and statistics achievement.
- The relationship between race and statistics achievement.
- The relationship between the students' learning program and their statistics achievement.
- The relationship between attitude and their statistics achievement.

3. Research findings

The χ^2 was done to identify the relationship between gender and race towards students' achievement in statistics. The research looks at whether gender and race affects the achievement in this course. Based on Table 1, it was found

that the value of χ^2 and p for gender and race are $\chi^2 = 0.089$; $p = 0.957 (>0.05)$ and $\chi^2 = 31.802$; $p = 0.000 (<0.05)$, respectively. Based on p -value, we conclude that gender does not affect the students' achievement while race affects their achievement in the statistics course.

Table 1. Relationship of statistics achievement based on gender and race

Demography		Achievement			χ^2 and p -value
		Weak	Medium	Good	
Gender	Male	10.1%	10.7%	16.8%	0.089 (0.957)
	Female	18.1%	17.4%	26.8%	
Race	Malay	23.5%	24.2%	18.8%	31.802 (0.000)
	Chinese	4.0%	2.7%	22.1%	
	Indian	.0%	.0%	1.3%	
	Others	.7%	1.3%	1.3%	

The research also identifies the relationship between program of study and pre-university achievement towards current achievement. Based on Table 2, it was found that the value of χ^2 and p for both factors are $\chi^2 = 33.142$; $p = 0.000 (< 0.05)$ and $\chi^2 = 11.121$; $p = 0.348 (> 0.05)$ respectively. From p -values, we can conclude that the program of study does affect whereas pre-university achievement does not have any effect on their achievement in statistics course.

Table 2. Relationship between program of study and achievement in statistics

Demography		Achievement			χ^2 and p -value
		Weak	Medium	Good	
Programme	TK	7.4%	8.1%	16.1%	33.142 (0.000)
	TR	.7%	2.7%	12.1%	
	TP	6.7%	5.4%	4.0%	
	TH	4.0%	6.0%	10.1%	
	TS	5.4%	3.4%	.0%	
	TC	4.0%	2.7%	1.3%	
			Pre-University achievement		
Programme	TK	1.4%	10.1%	26.1%	11.121 (0.348)
	TR	2.9%	1.4%	7.2%	
	TP	.0%	7.2%	8.7%	
	TH	1.4%	11.6%	10.1%	
	TS	.0%	1.4%	4.3%	
	TC	.0%	1.4%	4.3%	

The research also examine whether the students' entry qualifications and the students' achievement in their statistics course taken before they continue their study in FTSM contributes to their achievement in that subject. Based on Table 3, it was found that the students' entry qualifications (Matriculation, STPM, Diploma and others) do contribute towards their achievement in statistics with the value of $\chi^2 = 34.291$ and $p = 0.000 (< 0.05)$. On the other hand, their achievement during the pre-university level does not have any effect on their achievement in statistics with the value of $\chi^2 = 3.263$ and $p = 0.515 (> 0.05)$.

Table 3 Contribution the students' entry qualifications and pre-university achievement towards achievement in statistics

		Achievement			χ^2 and p -value
		Weak	Medium	Good	
Qualifications	Matriculation	14.8%	20.1%	15.4%	34.291 (0.000)

Pre-university achievement	STPM	4.7%	4.0%	24.8%	3.263 (0.515)
	Diploma	6.0%	2.7%	2.7%	
	Others	2.7%	1.3%	.7%	
	Weak	1.4%	.0%	4.3%	
	Medium	13.0%	8.7%	11.6%	
	Good	21.7%	18.8%	20.3%	

This research also looks at the contribution of attitude which involves six attitude components namely Affective, Cognitive, Values, Difficulty, Interest and Effort towards achievement in statistics. Research findings (Table 4) show that students' attitude as overall does not contribute towards their achievement in statistics ($\chi^2 = 1.077$ and $p = 0.584$). However, a few attitude components namely the affective component ($\chi^2 = 16.110$ and $p < 0.01$) and the cognitive component ($\chi^2 = 14.852$ and $p < 0.01$) have contributed to the achievement. Table 4 illustrates the findings of the analysis.

Table 4. Relationship between attitude and achievement

		Achievement			χ^2 and p -value
		Weak	Medium	Good	
Attitude	Negative	.7%	2.0%	2.7%	1.077(0.584)
	Positive	27.5%	26.2%	40.9%	
Affective	Negative	11.4%	16.1%	34.2%	16.110 (.000)
	Positive	16.8%	12.1%	9.4%	
Cognitive	Negative	4.7%	10.7%	23.5%	14.852 (.001)
	Positive	23.5%	17.4%	20.1%	

4. Discussion and conclusion

Based on the findings of the research, it is found that several demographic factors do influence students' achievement in the statistics course. This includes race and program of study undertaken by the students. For the factor of race, the pattern of percentage for the level of achievement in the statistics course is different. Majority of the students who scored low achievement are Malay students, but among the Malay students themselves, there is no visible difference in the percentage between the three levels; low, medium and high. Among the Chinese students, the highest percentage is shown for high achievement compared to medium and low. All of the Indian students show high achievement even though their number is small. The implication of the findings is that it raises the question about the factors which may have deterred students from mastering this course. The deterrent factors might involve the language of delivery which is the English language, the students' discipline or the lecturers' method of delivery which had failed to attract the students' attention.

For the programmes of Computer Science, Industrial Computing and Multimedia Studies, a relatively high percentage is shown for the high level of achievement. For the remaining programmes, which are Information Science, System Science and Management and Intelligence System, a higher percentage is shown for low and average achievements.

This research finds that positive attitude towards statistics does not influence students' achievement. This is because there are students whose achievements are low even when they showed positive attitude. This is consistent with the research findings of Gönen et al. (2006) which discovers that there is no relationship between students' attitude and their achievement in physics. Changes in students' attitude towards a certain course could not be detected at the early stage of learning the course (Hacıoğlu & Ulu, 2003). Change, on the contrary, needs to take a lot of time in order to have any effect or impact on students' achievement.

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