CASE STUDY: FACTORS INFLUENCING STUDENT'S MOTIVATION IN LEARNING MUFY MATHEMATICS UNIT 2

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ABSTRACT

The purpose of this case study is to explore the key factors influencing student's motivation in learning Monash University Foundation Year (MUFY) Mathematics Unit 2 in Sunway College Kuala Lumpur, Malaysia. Data was collected by distributing a questionnaire of 40 items to the students who had enrolled in MUFY Mathematics Unit 2. There were 160 students (83 female and 77 male) participated in this study. Students were requested to respond to a 5-point Likert scale items. Responses were analysed by using the factor analysis technique. Four factors had been extracted by referring to the rule of eigenvalue-over-one and the scree plot result. The combination of items with factor loadings greater than 0.55 considered as separate factors. These factors were lecturer's attributes, mathematics value, student's attitude towards mathematics and student's achievement. Lecturer's attributes was the factor that consisting most of the higher loading items. Subsequently, multiple linear regression was conducted by using the four extracted factors as the independent variables and the student's motivation as the dependent variable. Results revealed that there was a significant impact of the factors on the student's motivation in learning Mathematics Unit 2.

Key words: Motivation, lecturer's attributes, mathematics value, student's attitude, achievement

Introduction

For Monash University Foundation Year (MUFY) which is conducted in Sunway College Kuala Lumpur, there are six different units of mathematics have been offered to the students. They are Fundamental Mathematics (Unit 1 and 2), Mathematics (Unit 1 and 2), Advanced Mathematics (Unit 1 and 2). Most of the MUFY students have decided to study Mathematics (Unit 1 and 2) as they know well that mathematics has been set as one of the prerequisite for most of the degree courses offered in universities especially in Monash University.

According to Herbert (1978), mathematics serves physics, chemistry, biology, economics and other sciences. This means that for students to perform well in their degree courses, they must be well equip and familiar with mathematics. According to Geary and Hamson (2000), a better chance of employability, higher wages and higher achievement on job productivity are some of the reasons why students should literate in mathematics and have excellent quantitative competencies.

Recently, MUFY Mathematics Unit 2 lecturer had observed that the students' level of enjoyment in learning mathematics had dropped dramatically. They showed loss of interest during mathematics classes. Although they knew the importance of studying mathematics, but they seem to be no motivation in learning new mathematics knowledge. Subsequently, students were not able to perform well in their mathematics assessments. This scenario had encouraged the lecturer to look into or to examine the factors that might influence students' motivation in learning Mathematics Unit 2. The impact of the motivation on the education of mathematics of a student cannot be underestimated. There is a need to motivate students to arouse and sustain their interest in learning mathematics.

Mathematics education requires highly motivated students because it requires reasoning, making interpretations, and solving problems, mathematical issues, and concepts. The challenges of mathematics learning for today's education is that it requires disciplined study, concentration and motivation. To meet these challenges, learners must be focused and motivated to progress. Broussard and Garrison (2004) examined the relationship between motivation and academic achievement in elementary-school-aged children. They found that for a higher level of mastery, motivation was related to higher mathematics grades.

This study aimed to explore the key factors that influence student's motivation in learning MUFY Mathematics Unit 2. A sample of 160 students who had enrolled in Mathematics Unit 2 participated in this study. A questionnaire, which consisted of 40 items, was given to the respondents. All the questions designed were to measure the possible factors that might have influenced student's motivation in learning mathematics. Respondents had to answer all the questions by choosing the most appropriate level of agreement (5-point *Likert* scale items). After the raw data collection, the responses will be analysed by using the exploratory factor analysis technique. Significant factors will be extracted by referring to the rule of eigenvalue-over-one and the scree plot result. Subsequently, multiple linear regression will be conducted to evaluate the impact of those extracted factors on student's motivation in learning. In the multiple regression model, those extracted factors will be treated as the independent variables, while the student's motivation as the dependent variable. The significant impact of the factors will be analysed statistically.

Objective of this study

The objectives of this study are:
(1) To identify the factors that influence student's motivation in learning MUFY Mathematics Unit 2.
(2) To examine any significant impact of the identified factors on student's motivation in learning MUFY Mathematics Unit 2.

Literature Review

What is motivation? Motivation is a potential to direct behaviour that built into the system that controls emotion. This potential may be manifested in cognition, emotion and/or behaviour (Hannula, 2004). They exist as part of one's goal structures, one's beliefs about what is important, and they determine whether one will engage in a given pursuit (Ames, 1992).

There are two different types of motivation: intrinsic and extrinsic motivation. Intrinsic motivation is the drive or desire of the student to engage in learning. Intrinsically motivated students engage in the academic tasks because they enjoy the learning. They feel that learning is important with respect to their self-images, and they seek out learning activities for the sheer joy of learning (Middleton, 1993a). Their motivations tend to focus on learning goals such as understanding and mastery of mathematical concepts (Ames & Archer, 1988; Duda & Nicholls, 1992; Dweck, 1986). When students have an achievement goal, they are intrinsically motivated; they intend to accomplish something to satisfy their innate needs for improving their own competence (Deci and Ryan 2000). Meanwhile, those students extrinsically motivated engage in the academic tasks in order to obtain rewards such as good grades or appraisals. These students' motivations tend to center on such performance goals as obtaining favorable judgments of their competence from lecturers, parents, and peers or avoiding negative judgments of their competence (Ames, 1992; Ames & Archer, 1988; Duda & Nicholls, 1992; Dweck, 1986).

Teachers serve as a role model and a guide in encouraging students to study. A study that was conducted by Zhang (2014) also showed that teacher's enthusiasm was an effective predictor of student intrinsic motivation. Teacher's enthusiasm served as a positive external catalyst in facilitating student's interest, curiosity and motivation to learn. Effective teachers work to develop meaningful relationships with their students. Teachers engage in empathic caring communication with their students, and try their best to help students in course-related or personal problems. Supportive relationships from teachers are important in motivating students to learn (Wang, 2014).

Mathematics anxiety defined in the research literature as feelings of concern, tension or nervousness that experienced in combination with mathematics (Hembree, 1990). A high level of anxiety can affect an individual's ability to run working memory, the type of memory that allows us to hold information in our head as we complete tasks like mental calculations. The long-term impact of mathematics anxiety is the development of a negative attitude towards the subject. Subsequently, students tend to skip mathematics classes and always no confidence in attempting the mathematical tasks. Furthermore, students with low positive attitude always get lower marks in their assessments.

There is a common misconception that mathematics is only important for those people involve in the fields like engineering, science and finance. Some even think that mathematics is dealing with computations only. In fact, mathematics is a subject that can be applied to daily life situations. Through mathematics, students learn how to discriminate the use of mathematical knowledge for different situations, which is to know what knowledge is appropriate to use for what purposes. Mathematics value can be integrated through problems solving. These problems can be word problems, non-routine problems and real life problems that request different solving approaches (Taplin, 1998). Students feel more appreciate and motivate to learn mathematics when they can apply it into their daily life situations. Hence, we should equip students with all the skills in order to help them to face the challenges of their life.

According to Atkinson's Achievement Motivation Theory (1957), achievement motives as being either motive to approach success, which should propel an individual to seek success, and motive to avoid failure, which should deter an individual from failure. An individual with higher achievement goals tend to be motivated in learning. These achievements can be in the form of grades, awards, recognition from parents, lecturers and peers. Achievement and motivation are inter-correlated. Students who are most motivated to learn and excel in classroom activities tend to be the highest achievers (Schiefele, Krapp, & Winteler, 1992; Walberg & Uguroglu, 1980). Conversely, students who have little interest in academic achievement are at high risk for dropping out before they graduate from the high schools (Hardré & Reeve, 2003; Vallerand, Fortier, & Guay, 1997).

Methodology

The target group of this study was the students who had enrolled for the subject of Mathematics Unit 2 in Monash University Foundation Year (MUFY), Sunway College Kuala Lumpur. A sample of 160 students had participated in this study. These students had graduated from different education backgrounds such as Sijil Pelajaran Malaysia (SPM), General Certificate of Education Ordinary Level (GCE O-level) and Malaysia United Examination Certificate (UEC).

A structured and self-administrated questionnaire was given to the students, which consisted of two different sessions: demographic information of the respondents, and the level of agreement of the respondents based on 40 items, expressed in a 5-point *Likert* scale format (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5). The data collected was analysed by using the software, Statistical Package for the Social Science (SPSS version 21). Descriptive analysis, factor analysis and multiple linear regression were applied in this study and all the statistical analyses were conducted at a significant level of 0.05.

This study used exploratory factor analysis to identify the underlying factors that influence student's motivation in learning MUFY Mathematic Unit 2. Exploratory factor analysis (EFA) is a technique, which used to "reduce a large number of variables to some smaller number by telling us which belong together and which seem to say the same thing" (Emory and Cooper, 1991).

Kaiser-Meyer-Olkin (KMO) and Bartlett's test were applied in this study in order to evaluate the appropriateness of factor analysis for the 40 items. KMO measures the magnitude of observed correlation coefficients to the magnitude of partial correlation coefficients. The KMO index ranges from zero to one, with a minimum of 0.50 considered suitable for factor analysis (Hair, 1995). The Bartlett's Test of Sphericity is a test statistic used to examine the hypothesis that the variables are uncorrelated in the population (Malhotra, 2008). The Bartlett's test should be significant (p-value < 0.05) for factor analysis to be suitable (Tabachnick, 2007).

Under EFA, principal component analysis with orthogonal varimax rotation were used as the extraction method. Researcher referred to two different criteria, which were the rule of eigenvalue greater than one (Guttman 1954, Kaiser, 1960) and the scree test (Cattell, 1966) in determining the number of factors to be extracted.

An eigenvalue is the index of the amount of information represented in a factor (Thompson, 2004). Those components extracted should have an eigenvalue greater than one and consist a combination of few measured variables (items) with higher factor loadings. According to Comrey and Lee (1992), loadings of 0.71 or higher considered as "excellent", 0.63 is "very good", 0.55 is "good", 0.45 is "fair" and 0.32 is "poor".

Meanwhile, the scree test is a graphical test, which is constructed by plotting eigenvalues along the ordinate (y-axis) and factor numbers along the abscissa (x-axis) (Tanguma, 2000). A mountain-like graph (scree plot) is produced, because successively extracted factors have successively smaller eigenvalues. The eigenvalues associated with the factors included on the "mountainous" part of the graph represent solid, noteworthy factors which should be retained; whereas, trivial factors compose the "scree" (rubble of loose rock not attached to mountains), which should be discarded (Thompson, 2004).

Those factors identified under EFA were further analysed by using multiple regression technique. Multiple regression analysis is a statistical technique used to analyse the relationship between single dependent variable and several independent variables. In this study, those identified factors will be the independent variables while the student's motivation will be the dependent variable. Researcher wanted to test whether there is any significant impact of factors on student's motivation in learning Mathematics Unit 2.

Researchers are advisable to examine the independent variables whether the variables have satisfied the assumptions of multiple linear regression: linear relationship, multivariate normality, no multicollinearity, independent errors and homoscedasticity. In this study, the linearity assumption was tested by creating partial regression plots. Visually inspecting the plots will help us to justify whether the relationship between the independent and dependent variables is linear. Meanwhile, in order to check the assumption of multivariate normality of data, a histogram with a fitted normal curve, and a normal P-P plot of regression standardized residual were constructed.

Multicollinearity or collinearity is the situation where two or more independent variables are highly correlated. In this study, multicolinearity problem was examined by using the average variance inflation factor (VIF) and tolerance (T). If the average VIF of a variable exceeds 10, then that variable is said to be highly collinear (Gujarati, 2006). A tolerance of less than 0.2 indicates a multicollinearity problem (Obrien, 2007).

Additionally, to test the assumption of independent errors (no autocorrelation); the Durbin-Watson (d) statistic was used. The Durbin-Watson statistic ranges in value from zero to four. A value, which is closer to two, indicates non-autocorrelation; a value towards zero indicates positive autocorrelation and a value towards four indicates negative autocorrelation. As a rule of thumb, values of $1.5 < d < 2.5$ show that there is no autocorrelation in the multiple linear regression data (Durbin, 1950).

Lastly, the assumption of homoscedasticity was tested by plotting a scatter plot of the studentized residuals against the unstandardized predicted values. Homoscedasticity describes a situation in which the error term (that is, the "noise" or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all the values of the independent variables. Heteroscedasticity (the violation of homoscedasticity) is present when the size of the error term differs across values of an independent variable.

Results

Descriptive Analysis – Demographic background

Out of 160 sample respondents, 83 (52%) were girls and 77 (48%) were boys (as shown in Figure 1). They were in the range of 17 to 22 years old with majority (70%) aged 19 years old (as shown in Figure 2). Students were graduated from different education backgrounds such as SPM, O-level, UEC and the others. Based on the data in Figure 3, SPM holders ranked the highest (73.8%) followed by the O-Level holders (19.4%). For the item, "Degree course that plans to pursue in university", most of the students had indicated these three fields: engineering, business and pharmacy (as shown in Figure 4).

Figure 1: Student's gender

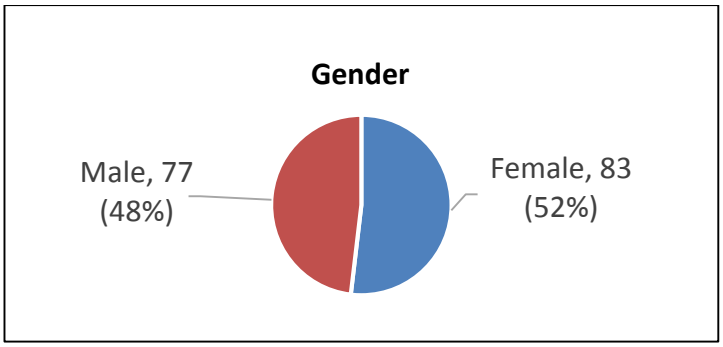


Figure 2: Student's age

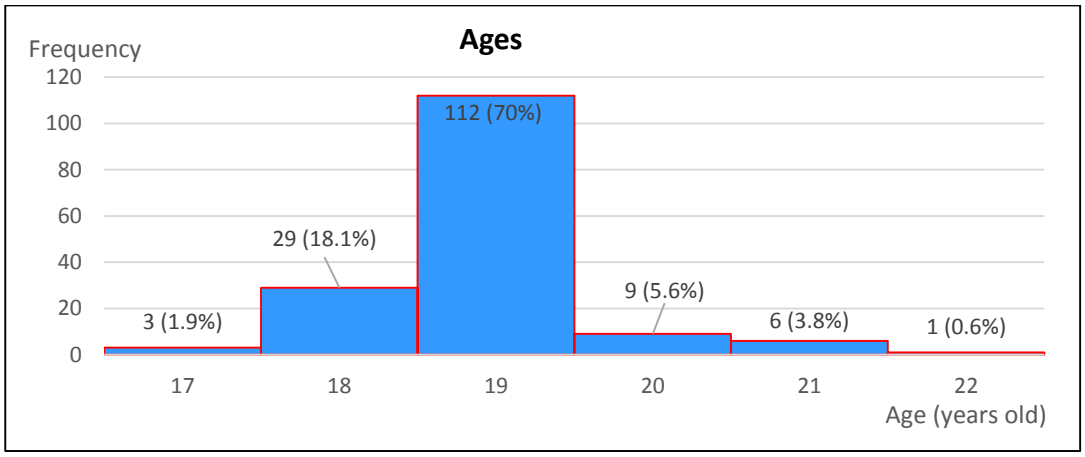


Figure 3: Student's education background

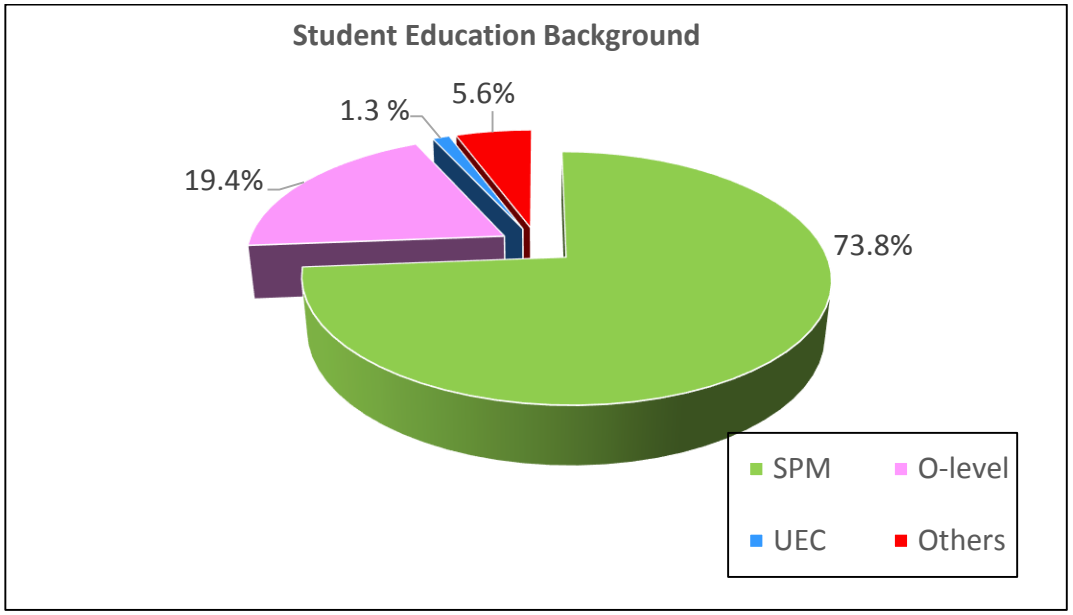
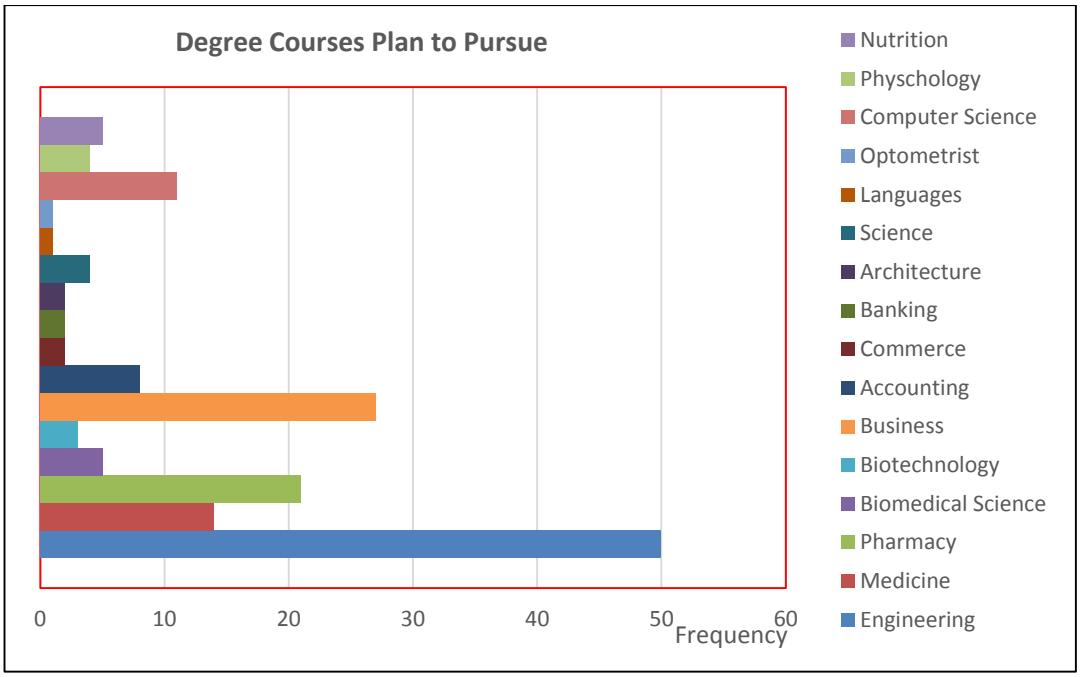


Figure 4: Degree course that plans to pursue



Internal Consistency of Reliability

Researcher had tested the internal consistency of the 40 items by using SPSS Cronbach Alpha. The 40 items had a reliability alpha of 0.91 (as shown in Table 1), which was above the recommended reliability of 0.7 (Kaplan and Saccuz, 1993). This had indicated that all the items in the questionnaire had a high degree of internal consistency for the study. Additionally, items that were categorised under the four extracted factors underwent the reliability analysis. Table 1 shows the results of the internal consistency for the four factors. The scale on lecturer's attributes had a very high alpha, 0.934. The scale on mathematics value and student's achievement had a high alpha of 0.819 and 0.816 respectively. The scale on student's attitude had a moderate alpha of 0.799. Hence, it can be concluded that these factors were highly reliable in measuring THE student's motivation in learning Mathematics Unit 2.

Table 1: Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No of Items
0.910	0.921	40
Factors	Number of items	Cronbach's Alpha
Lecturer's attributes	11	0.934
Mathematics value	5	0.819
Student's achievement	4	0.816
Student's attitude	4	0.799

Exploratory Factor Analysis (EFA)

In this study, KMO was 0.834 (> 0.5) and the Bartlett's test χ^2 = 3698.736 with a significant *p*-value = 0.00 (< 0.05) at 5% level of significance (as shown in Table 2). This meant that the distribution of data was adequate for conducting the factor analysis.

Table 2: KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.834
Bartlett's Test of Sphericity	Approx. Chi-Square	3698.736
	df	780
	Sig.	0.000*

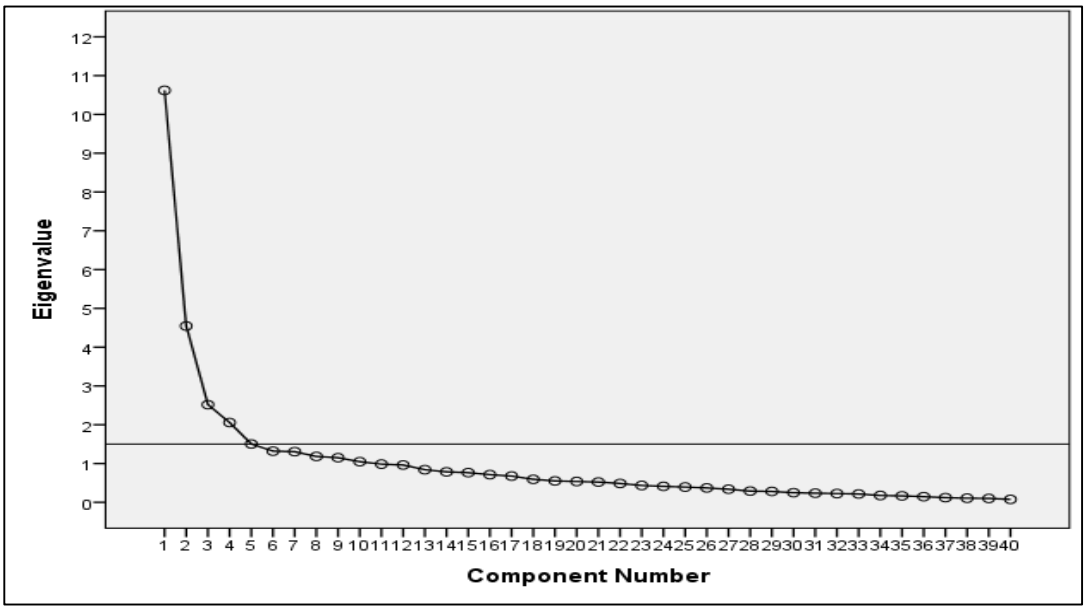
*Significant at 0.05 level

Based on the result in Table 3 and by using the rule of eigenvalue-greater-than-one, there would be 10 components (factors) to be extracted. However, researcher had noticed that those factors that had been extracted under the Component 5 to 10 were trivial factors, which only had one or two measured variables with higher loadings. Hence, by using eigenvalue-greater-than-one rule only was not adequate in determining the number of factors to be retained. Due to this reason, researcher had decided to use the scree test as the second criteria in determining the number of factors to be retained. The scree plot in Figure 5 shows that the eigenvalues seem to be level off from the Component 5 onwards. This had indicated that there should be four components to be extracted and the others should be discarded.

Table 3: Initial EFA with total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.620	26.551	26.551	10.620	26.551	26.551
2	4.544	11.361	37.912	4.544	11.361	37.912
3	2.517	6.293	44.205	2.517	6.293	44.205
4	2.057	5.141	49.346	2.057	5.141	49.346
5	1.504	3.760	53.106	1.504	3.760	53.106
6	1.319	3.298	56.404	1.319	3.298	56.404
7	1.306	3.265	59.669	1.306	3.265	59.669
8	1.183	2.957	62.626	1.183	2.957	62.626
9	1.150	2.875	65.501	1.150	2.875	65.501
10	1.047	2.618	68.119	1.047	2.618	68.119
11	.984	2.461	70.580			
12	.962	2.405	72.985			

Figure 5: Scree plot



Combining of these two criteria, there were four factors that had been extracted which accounting for 49.3% of the total variance. In further, based on the rotated component matrix obtained in this analysis, variables (items) had been sorted under these four factors: Lecturer's attributes (*LEC*), Mathematics value (*VAL*), Student's attitude towards mathematics (*ATT*) and Student's achievement (*ACH*).

Table 4 displays the variables that had been sorted according to the four factors. Here, researcher had used a minimum loading of 0.55 as the reference in selecting the respective variables.

Table 4: Factor loadings of each item obtained from EFA (Varimax rotation)

Factor 1: *LEC*	loadings
Lecturer is approachable and friendly.	0.864
Lecturer is open to suggestions and opinions.	0.849
Lecturer is helpful.	0.836
Lecturer has good rapport with students.	0.814
Lecturer has an effective lecture delivery.	0.806
Lecturer has an appealing personality with good sense of humour.	0.797
Lecturer is enthusiastic in lecturing.	0.789
Lecturer gives structured and organised lectures.	0.717
Lecturer pays attention to me.	0.716
Lecturer does not put pressure on me.	0.641
Lecturer is subject knowledgeable.	0.582
Factor 2: *VAL*	loadings
Mathematics is challenging.	0.830
Mathematics is interesting.	0.774
Mathematics provides me the opportunity to satisfy my own curiosity.	0.623
I can apply mathematics in my daily life.	0.572
Mathematics helps me to explore ideas.	0.555
Factor 3: *ATT*	loadings
I can do well on mathematics tests.	0.833
I am able to solve the mathematics problems.	0.776
I am able to understand difficult mathematics concepts.	0.748
I will never give up easily when I face those difficult mathematics tasks.	0.581
Factor 4: *ACH*	loadings
I am motivated when the lecturer accepts my ideas.	0.888
I am motivated when other classmates accept my ideas.	0.853
I am motivated when I can involve in mathematical competitions.	0.709
I am motivated when I have a good arithmetic ability.	0.695

Factor 1: Lecturer's Attributes

This factor was the most important as it accounted for 26.55% of the total variance. In total, eleven variables had been loaded on this factor. Among these eleven variables, the variable "Lecturer is approachable and friendly" had the highest loading, which was 0.864. This indicated that MUFY students were motivated to learn Mathematics Unit 2 when their mathematics lecturers were friendly and approachable. Meanwhile, lecturers' support and caring were important as well in motivating students in learning.

Factor 2: Mathematics Value

This factor had accounted for 11.36% of the total variance. Five variables had been loaded on this factor. Among all, the variable "Mathematics is challenging" had the highest loading, which was 0.830. This revealed that MUFY students were motivated to learn Mathematics Unit 2 when they can understand and appreciate mathematics value in their daily life situations. They would like to explore more in the subject when it was challenging and interesting.

Factor 3: Student's Attitude towards Mathematics

This factor had accounted for 6.29% of the total variance. Four variables had been loaded on this factor. The variable "I can do well on mathematics tests" had the highest loading of 0.833 compared to the others. This indicated that students with positive attitudes towards mathematics always believe that they would be able to solve mathematics problems and could perform well in mathematics tests. They would never easily give up when they were facing a difficult mathematical task.

Factor 4: Student's Achievement

This factor had accounted for 5.14% of the total variance. Four variables had been loaded on this factor. The variable "I am motivated to learn mathematics when the lecturer accepts my ideas" had the highest loading of 0.888. This result revealed that MUFY students were motivated to learn Mathematics Unit 2 when the lecturers and classmates had accepted their ideas during the class discussions. They had admitted that the recognition from the lecturers and peers as part of their achievement in learning mathematics.

Therefore, as per finding, student's motivation was influenced by lecturer's attributes, mathematic value, student's attitude towards mathematics and student's achievement.

Multiple Regression Assumptions

Researcher had tested the data based on the five key assumptions required. Results were summarized in Table 5, 6 and 7. From the tests, it can be concluded that data was not violated from the assumptions and hence, the model was valid and reliable for the regression.

Table 5: Tests based on multiple regression assumptions

Assumptions	Test/Statistics	Observations/Outcomes	Conclusion
Linear relationship	Partial Regression Plots	Graphs are in a positive direction.	There is a linear relationship between the independent and dependent variables.
Multivariate normality	Histogram/ Normal P-P Plot	Histogram appears in a bell-shaped curve with mean equal to zero. All the points lie along a positive straight line.	Normality assumption is not violated.
Multicollinearity	Variance Inflation factor/Tolerance	T = 1 VIF = 1	Data is free from multicollinearity problem.
Autocorrelation	Durbin-Watson test	d = 2.16 (within 1.5 < d < 2.5)	Data is free from autocorrelation problem.
Homoscedasticity	Scatter Plot	Residuals are randomly scattered along the x-axis.	Data is homoscedasticity.

Table 6: Multicollinearity test statistics

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	Collinearity Statistics	
		B	Std. Error	*Beta*			Tolerance	VIF
1	(Constant)	3.831	0.024		157.022	.000*		
	LEC	0.210	0.024	0.481	8.599	.000*	1.000	1.00
	VAL	0.164	0.024	0.374	6.688	.000*	1.000	1.00
	ATT	0.106	0.024	0.242	4.325	.000*	1.000	1.00
	ACH	0.128	0.024	0.292	5.218	.000*	1.000	1.00

*Significant at 0.05 level

Table 7: Autocorrelation test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.718	0.515	0.503	0.30863	2.160

Multiple Linear Regression

Multiple regression analysis was applied in this study in order to achieve the second objective, which was to determine the impact of the four identified factors towards student's motivation in learning MUFY Mathematics Unit 2. The four factors were taken as the independent variables and the student's motivation as the dependent variable (as shown in Figure 6). A set of hypothesis was proposed as follow:

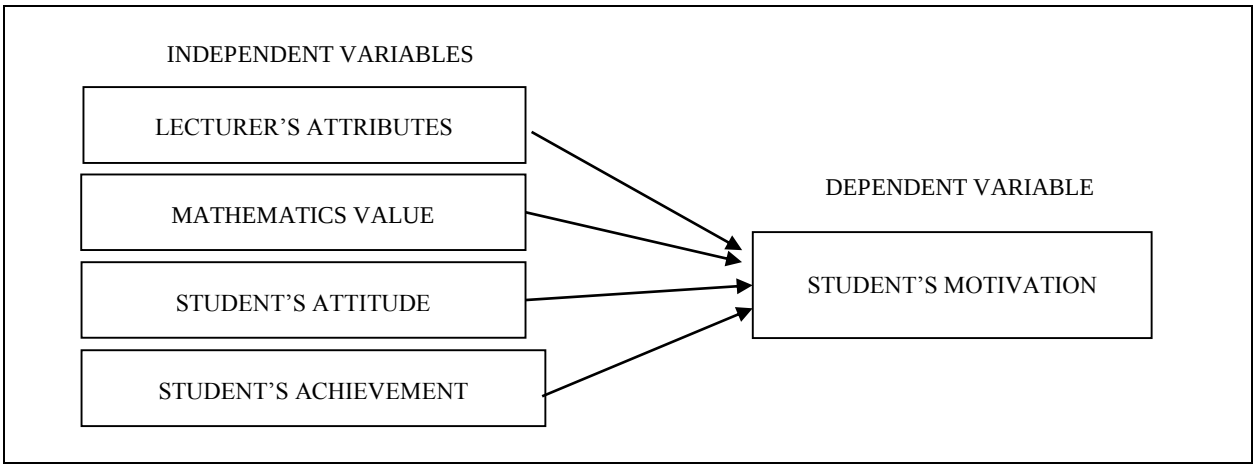
H_0: There is no significant impact of the factors on student's motivation in learning Mathematics Unit 2.
H_1: There is a significant impact of the factors on student's motivation in learning Mathematics Unit 2.

To test the set of hypothesis, a proposed multiple regression model was applied as:

Model development:

$$MOTIVATION = \beta_0 + \beta_1(LEC) + \beta_2(VAL) + \beta_3(ATT) + \beta_4(ACH)$$

Figure 6: Factors influencing student's motivation in learning mathematics



In this study, analysis of variance (ANOVA) used to assess the overall significance of the model. At 5% level of significance, the *p*-value = 0.000 (as shown in Table 8) which meant that the overall regression model was significant. Multiple regression results were displayed in Table 9. It showed that all the four factors were significantly related to the student's motivation (*MOTIVATION*) with *p*-value < 0.05. Hence, the null hypothesis (H_o) was rejected. Coefficients for all the factors were positive, meant that they were having positive impact on *MOTIVATION*. Adjusted R^2 was 0.503 (as shown in Table 10) which meant that 50.3% of the variation in *MOTIVATION* can be explained by the four independent factors: *LEC*, *VAL*, *ATT* and *ACH*.

Model:

$$MOTIVATION = 3.831 + 0.210\,(LEC) + 0.164\,(VAL) + 0.106\,(ATT) + 0.128\,(ACH)$$

Table 8: ANOVA for regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.679	4	3.920	41.152	0.000*
	Residual	14.764	155	0.095		
	Total	30.444	159			

*Significant at 0.05 level

Table 9: Multiple regression analysis results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.831	0.024		157.022	0.000*
	LEC	0.210	0.024	0.481	8.599	0.000*
	VAL	0.164	0.024	0.374	6.688	0.000*
	ATT	0.106	0.024	0.242	4.325	0.000*
	ACH	0.128	0.024	0.292	5.218	0.000*

*Significant at 0.05 level

Table 10: Model summary

Model	R	R Square	Adjusted R Square
1	0.718	0.515	0.503

Discussion

The major finding of this study showed that the student's motivation in learning MUFY Mathematics Unit 2 was significantly influenced by the four factors: lecturer's attributes; mathematics value; student's attitude towards mathematics and student's achievement. Additionally, the results of multiple linear regressions revealed that all the four factors were statistically significant in giving impact on the student's motivation at 5% level of significance.

These four factors will become very helpful indicators for MUFY Mathematics lecturers in discussing the issues that are related to the students' learning. Since the lecturer's attributes be a main factor in affecting the student's motivation, lecturers are encouraged to improve their personal characteristics and professionalism. Adeogun and Osifila (2008) emphasized that teacher's attributions and instructional quality as teaching methods are the most important factors affecting student learning. Caring and helpful lecturers are always sensitive to their students' situation and performance. They will give appropriate guidance and advice to the students in relation to their academic problems. In addition, a good relationship and interaction between lecturers and students also help in motivating students in the subject learning.

Meanwhile, we should expose the students to a variety of mathematical tasks and situations. Students are motivated to learn when they can understand the value of learning mathematics, and be able to apply it in their future study or daily applications. Hence, MUFY mathematics lecturers may have to review, redesign and restructure their instructional materials/media and students' assessments in order to make the subject to be more challenging and interesting. This may sustain students' motivation in learning.

For students' aspect, they have to change their negative mindset towards mathematics. They should not over stress themselves or give up easily when they are facing with any difficult and complicated mathematical tasks. In fact, students have to learn the ways to overcome their fear on mathematics. Discussing or sharing their problems and weakness with lecturers and peers may help them to improve. Positive attitudes and positive experiences in mathematics can increase student's motivation and engagement. Students with positive attitudes enjoy in the learning process. They feel relax and confident in doing mathematical tasks. They will treat the mathematics problem as a challenge instead of a burden. Students who are confident over their academic performance tend to be more highly motivated in learning. Hence, there is a need for the mathematics educators in helping and generating a positive attitude towards mathematics among students.

Lastly, student's achievement also be a factor affecting student's motivation in learning mathematics. Students are motivated to learn when they can achieve their goals. Recognitions from lecturers and peers are important to students as well. Students feel that they have achieved in learning when the lecturers and peers are accepting their ideas. Students are motivated when they have given the opportunities to participate in any mathematical competitions.

In this study, researcher did not investigate the impact of student's demographic background towards motivation in learning Mathematics Unit 2. Hence, future studies encourage researchers to carry out a survey by looking into the impact of student's age, gender, nationality, education background, and parent's educational level towards student's motivation in learning mathematics. Besides that, researchers may increase the sample size in order to get better findings.

Conclusion

As a conclusion, the findings in this study will be beneficial to MUFY Mathematics Unit 2 lecturers as this study provides an understanding to the underlying factors that influence student's motivation in learning Mathematics Unit 2. Consequently, by monitoring these factors, the student's motivation in learning mathematics can be increased and their mathematics performance will be improved in the near future.

References

Adeogun, A. A. & G. I. Osifila (2008). Relationship between educational resources and students' academic performance in Lagos state Nigeria. *International Journal of Educational Management (IJEM)*, *5&6*: 144-153.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*, 261-271.

Ames, C. & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, *80*, 260-267.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*, 359-372.

Broussard, S. C., and Garrison, M. E. B. (2004). The relationship between classroom motivation and academic achievement in elementary-school-aged children. *Family and Consumer Sciences Research Journal*, 33(2), 106-120.

Cattell, R. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*, 245-276.

Comrey, A. L. & Lee, H. B. (1992). *A first course in factor analysis*, 2nd ed., Hillsdale, NJ: Lawrence Erlbaum Associates.

Duda, J. L. & Nicholls, J. G. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology*, *84*, 290-299.

Durbin, J. & Watson, G. S. (1950). Testing for serial correlation in least squares regression I. *Biometrika 37*: 409-428.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, *41*, 1040-1048.

Geary, D. C. & C. O. Hamson (2000). Improving the mathematics and science achievement of American children: Psychology's role. *Education Directorate, American Psychological Association.*

Gujarati, D. N. (2006). *Basic Econometrics*, 4th ed., Tata McGraw-Hill Publishing Company Ltd, New Delhi.
Guttman, L. (1954). Some necessary conditions for common factor analysis. *Psychometrika, 19*, 149-162.
Hair J, Anderson RE, Tatham RL, Black WC. (1995) *Multivariate data analysis.* 4th ed. New Jersey: Prentice-Hall Inc.
Hannula, M. S. (2004). Regulation motivation in mathematics. Paper presented at the *10th International Congress on Mathematical Education*, http://www.icme10.dk/, TSG 24, Copenhagen, Denmark.
Hardre, P. L., & Reeve, J. (2003). A motivational model of rural students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology, 95*, 347–356.
Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education, 21*(1), 33–46;
Herbert, K. (1978). *The New Book of Popular Science Daribury*, Connecticut: Grolier Inc.
Kaiser HF. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement. 20*:141-51.
Kaplan, R. M & Saccuzz, D. P. (1993). *Building a test, psychological testing: Principle, applications and issues*. California: Brooks/Cole
Malhotra, N. K. (2008). *Marketing Research: An Applied Orientation*, 5th ed., Pearson Prentice Hall, New Delhi.
Middleton, J. A. (1993a). An analysis of the congruence of teachers and students' personal constructs regarding intrinsic motivation in the mathematics classroom (Doctoral dissertation, University of Wisconsin-Madison, 1992). *Dissertation Abstracts International, 53*, 3150A.
O'Brien, R. M. (2007). "A Caution Regarding Rules of Thumb for Variance Inflation Factors". *Quality & Quantity 41* (5): 673.
Ryan, R. M. & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54-67.
Schiefele, U., Krapp, A., & Winteler, A. (1992). *Interest as a predictor of academic achievement: A meta-analysis of research. The role of interest in learning and development* (pp. 183-212). Hillsdale, NJ: Erlbaum
Tabachnick B. G. & Fidell L. S. (2007). *Using Multivariate Statistics*. Boston: Pearson Education Inc.
Tanguma, J. (2000). Determining the number of factors to retain. Paper presented at the annual meeting of the *Southwest Educational Research Association*, Dallas.
Taplin, M. (1998). Education in human values through mathematics: Mathematics through education in human values. Hong Kong: *Sathya Sai Baba Center of Hong Kong*. ISBN 962-8430-01-3.
Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. Washington, DC: *American Psychological Association*.
Uguroglu, M. E., & Walberg, H.J. (1979), Motivation and achievement: A quantitative synthesis. *American Educational Research Journal*, 16, 375-389
Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72*, 1161–1176.
Wang, T. R. (2014). Formational turning points in the transition to college: Understanding how communication events shape first-generation students' pedagogical and interpersonal relationships with their college teachers. *Communication Education, 63*, 63-82. doi:10.1080/03634523.2013.841970.
Zhang, Q. (2014). Assessing the effects of instructor enthusiasm on classroom engagement, learning goal orientation, and academic self-efficacy. *Communication Teacher, 28*, 44-56.