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Association of Interest, Attitude and Learning Habit in Mathematics Learning Towards Enhancing Students' Achievement

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ABSTRACTS

Mathematics is fundamentally important for Science and Technology, as well as in engineering. Mathematics is compulsory for students since all engineering subjects were Mathematically oriented. However, the preliminary study found that students' achievement in Mathematics courses have been associated with three main factors, namely interest, attitude and learning habit, as in the KASH Model (Knowledge, Attitude, Skills and Habits). This Model stipulated that poor performance is not just lacking in knowledge and skills but also including poor attitude and habits. Therefore, this study aims to investigate the students' level and relationship between interest, attitude and learning habit based on KASH Model. A total of 58 students were selected as a sample of the study, who enrolled in the Thermodynamics, Fluid Mechanics and Solid Mechanics subjects. A set of questionnaires with 21 items was used to collect data; a descriptively analysis was used to find the mean and percentage, as well as correlation index using Pearson. The results; high level of factor of interest, attitude and learning habit, and high correlation between interest, attitude and habit. The implication is that teaching and learning process must equally fostering all these variables to achieve a high level of students' achievement, especially in Mathematics subjects.

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I. INTRODUCTION

Science, Technology, Engineering and Mathematics or known as STEM education plays an important role in economic growth and national development, particularly in producing capable future engineers and technologist. In addition, it serves as the basis for the nation building and the unification of Malaysia's unity ever since (Bahrum *et al.,* 2017). Mathematics is a field of knowledge used to train a human mind to think logically and systematically in solving problems and making decisions.

Mathematics nature that promotes meaningful and challenging learning makes it one of the areas of education emphasized by the Malaysian Ministry of Education (MOE) in building human capital. For that reason, MOE has set Mathematics as one of the curriculum subjects that every student has to learn during the period of their education system at school level while, for the educational system at tertiary level, Mathematics is a subject that must be learned by students who choose to continue their studies in Mathematical-specific areas such as Science, Technology, Engineering and Economics (Leiss *et al.,* 2010).

Besides, Mathematics is needed and widely used in education. However, the achievement of students in Mathematics is still weak (Rylands & Coady, 2009). Based on previous studies, there are various factors that influence these problems, among others are the factors of interest, attitude, learning habit, motivation, teacher teaching or lecturer, learning style, environment and also concern in learning Mathematics (Leiss *et al.,* 2010). Therefore, students need remediation, which, in its current state, is not sufficient (Tella, 2017).

Teacher who doesn't have both the academic and the professional teaching qualification would undoubtedly have a negative influence on the teaching and learning of their subject. Apart from qualification, other teachers' variables still exit which can either positively or negatively predict students' Mathematics performance (Er, 2018). Mathematical skills and their achievements in applied engineering subjects such as Mechanics and Mechanical Engineering subjects shows that there is a significant positive correlation between Mathematics and applied engineering subjects' grades.

Interest is one of the factors that have been identified related to the achievement of Mathematics among students in Vocational Education. Many students may then continue to fall behind the standard of Mathematics achievement and lose their interest in Mathematics that eventually make them give up on learning it (Yeh *et al*., 2019). Without students' interest in Mathematics, the tendency of the student to pay attention to the subject will be reduced. The literature reported that students who did not succeed in obtaining good results in Mathematics examinations at school were due to weaknesses in some of the basic skills in Mathematics (Minarni *et al.,* 2016). As a result, students are less interested in Mathematics.

In other hand, attitude factors are the next factor that been identified in influencing Vocational Education students' Mathematics achievement in Mathematics. In a study conducted by (Azina & Halimah, 2012), they found that the relationship between the attitudes of the students has a significant positive effect with the achievement of students in Mathematics. Abu and Eu in their study stated that students' attitudes toward Mathematics are very important (Abu and Eu, 2017). If a student has an indifferent attitude towards the subject, it will indirectly affect the student's achievement.

Besides, learning habit were also among the factors that influence the achievement of students in Mathematics. The researchers

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find that it become the main causes of students' achievement in Mathematics (Fitrianti & Riyana, 2020). Students with continuously low performance in Mathematics may eventually lose their interest and will affect their learning habit (Yeh *et al*., 2019). The researchers found that students who achieved low achievement in Mathematics were due to poor learning habit and lack of skills in training and taking tests (Fitrianti & Riyana, 2020).

(Ahmad *et al.*, 2018) stated that students' metacognitive ability was generally not optimally developed to solve the Mathematics problems, due to the limited scope of the materials and cognitive teaching strategy handled by verbal presentation, and inadequate continuous training in facing cognitive tasks, such as understanding and solving problem. Therefore, the purpose of this study was to investigate the students' level and association between interest, attitude and learning habit using the KASH Model (Ahmad *et al.*, 2018).

1.1 A case study: Students' achievement in Mathematics

Bachelor of Vocational Education students were students who endure their studies in Bachelor Degree at Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia. Here, students will attend various programs in the field of Technical and Vocational Education and Training or TVET offered at the faculty. Although these students are in the field of TVET, they are still required to enrol in Mathematics courses as well as other Mathematical-oriented courses offered throughout the programme.

Thus, in order to find out why the achievement of students in Mathematics is still weak, the researcher conducted a preliminary study using a semi-structural interview method to identify the factors that influence the achievement of students in Mathematics. The study was conducted on 10 respondents involving the 1st and 3rd year students from Faculty of Technical and Vocational Education where researchers used the voice recorder to record information during the interview. A total of 10 students were selected based on the same characteristics of Mathematics background subjects in their Bachelor Degree courses.

The result; the findings indicated that 26% of the students have uttered interest factor, 21% of the students stated the attitude factor, 21% of the students stated the factor of learning habit, 16% of the students expressed the motivation factor and 16% of the students stated that the teaching factor of the lecturers influenced their achievement in Mathematics.

1.2 KASH model

KASH model refers to Knowledge, Attitude, Skills and Habits, indirectly affects safety and health performance and hence the success of the individual (Hollywood *et al.*, 2016). However, only three factors intentionally involve in this study which were interest, attitude and learning habit based on preliminary study that been conducted due to the percentages data. Students had positive attitudes towards Mathematics in terms of its value while they had a neutral attitude when it comes to their self-confidence, enjoyment, and motivation in Mathematics (Capuno *et al*., 2019). Based on this premise, it was clearly shown that interest; attitudes and learning habit associates to students' achievement in Mathematics.

2. METHODS AND MATERIALS

The study was conducted as a descriptive quantitative survey design using questionnaire, which was the most suitable approach to gather accurate information of a population (Woo *et al*., 2017). According to Literature, the purpose of the descriptive review is to obtain a measure or description

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of the condition or characteristics of the population (Yokoe *et* al., 2017).

2.1 Population and sampling

A total of 67 random sampled students who enrolled in the Mathematics-oriented mechanical engineering courses such as Thermodynamics, Fluid Mechanics and Solid Mechanics subjects. This is based on the Krejcie and Morgan samples size table which sets the number of samples required for a study to be conducted based on the population (Krejcie & Morgan, 1970).

2.2 Instruments

The questionnaire consists of two major parts; part A (demographic information) and part B (students' level of interest, attitude and learning habit). In part B, a total of 21 items were developed within 3 main constructs which were level of interest, attitude and learning habit adapted from KASH (Hollywood *et al*., 2016).

These instruments have been validated by experts from education area and reliability index was developed based on Cronbach's Alpha (α), which is in this case appropriate for research work reliability coefficient of .70 or higher is considered acceptable in most social science research situations. The result indicated a high index of reliability at 0.925 ensuing that this questionnaire can be used for data collection (Hair *et al.,* 2011). Issue of clarity was catered using a series of pilot study, in order to develop items with clear and understandable statement for samples' response.

2.3 Data analysis

Data were analysed using quantitative descriptive analysis aided by *Statistical Package for Social Science for Windows Version 22.0 (SPSS V22.0)* program. The result of Part A was presented in frequency and percentage, while Part B were using mean scores (*M*) and standard deviation (*SD*), as well as a Pearson's correlation test.

3. RESULTS

A total of 58 students have completed the questionnaire out of 67 that out for distribution. Findings in Part A of the questionnaires contain information on respondents' characteristics such as gender, age, Mathematics courses involvement and respondent study program. The data obtained will be analysed and discussed in descriptive statistics using frequency.

Findings indicated that the number of respondents aged 20 to 25 was 40 (69.0%) while the number of respondents aged 26 to 30 was 18 (31.0%) of the total number of 58 respondents. The number of respondents in 1st Semester was 36 (62.1%) while the number of respondents in 2nd Semester was 22 (37.9%) of the total number of 58 respondents. Lastly, the number of respondents for the General Machining Program were 21 (36.2%), Welding and Fabricating Metal programs were 15 (25.9%) while Refrigeration and Air Conditioning programs were 22 (37.9%) of the total number of 58 respondents. The gender proportion in percentage is indicated in **Table 1.**

3.1 Students' interest in Mathematics learning

Data analysis indicated that among the seven (7) items for the interest factor listed, there were five (5) items which recorded mean score with high level and two (2) other items recorded mean score for medium level as shown in **Table 2**. Among the five (5) items that have recorded a min score for the high level, item 4 has recorded a mean score of 4.66 which is the highest level of the mean. This item shows that the respondents were satisfied when they can answer Mathematics questions properly.

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The means score for all items of the interest factor is 3.95 (*SD*=0.85), at high level. It is indicating that students showing their interest towards Mathematics learning **Table 2**.

3.2 Students' attitude towards Mathematics learning

Meanwhile, finding for attitude level show that seven (7) items of attitudes were listed and there were six (6) items that recorded a mean score for a high level and one (1) item recorded a mean score for a moderate level as shown in table 3. There were six (6) items that have recorded a high score level and item 13 has recorded a mean score of 4.60 which is the highest mean score for attitude level. This item indicates that the respondents are willing to accept the rectifications and constructive advice from the lecturers in relation to the Mathematics subject.

The mean score for all items to gauge students' attitude is at 4.14 (SD=0.68), at high level. From the results, the interpretation is that students have a good attitude towards Mathematics learning **Table 3**.

3.3 Students' learning habit towards Mathematic learning

Result indicated that the seven (7) items for the listed learning habit, there were six (6) items which recorded a mean score for high level and one (1) item recorded a mean score for a moderate level as shown in table 4. Among the six (6) items that have recorded the mean score with high level, item 20 has recorded a mean score of 4.28 which is the highest mean score for learning habit level. This item shows that respondents can remember Mathematics lessons by making repeated exercises. Overall mean score is 3.91 (SD=0.81), at high level, indicating that students have a positive learning habit towards Mathematics **Table 4**.

3.4 Correlations between interest, attitude, and habit in Mathematics learning

Table 5 shows that there is a strong positive relationship between students' interest and attitude in learning mathematics, r = 0.82. However, there is no any significant relationship between students' habit with students' interest or attitude in learning mathematics.

4. DISCUSSION

The relationship between Knowledge, Attitude, Skills and Habits stipulated by KASH Model, yet this study was strengthening this model from the findings, whereby interest, attitude and learning habit plays an important role in accomplishing students' performance in Mathematics too (Hollywood, 2016). In this study, most of the respondents feel satisfied in solving Mathematics problems after trying to get the right answers. This finding supported by the study conducted (Fredricks *et al*., 2018), which states that high interest students will always work hard and diligently to improve themselves that can be concluded as their satisfaction will only be achieved when they study Mathematics and can understand it. The tendency of a student who is not interested in Mathematics subjects will encourage him to do less training for the subject if not asked.

This is also supported by a study conducted by (Azina & Halimah, 2012). that indicate interest is acting as a motivator for students to be active or to explore further in learning activities. The findings of these interest factors are in line with (Tefa, 2020) findings where the level of interest in Mathematics is high. The low-achieving and the high-achieving students also maintained a rather high level of interest in learning Mathematics through suitable learning environment (Yeh *et al*., 2019).

Table 1. Gender proportion

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Gender	Percentage (%)
Male	53.4
Female	46.6
Total	100.0

Table 2. Students' interest in Mathematics learning

No	Item	Mean	SD
1	**I like Mathematics since elementary school**	3.81	0.91
2	**Although my Mathematics results are not outstanding, I still love Mathematics**	4.09	0.84
3	**I am excited to attend Mathematics classes**	4.03	0.84
4	**I am happy to answer Mathematics questions correctly**	4.66	0.58
5	**I like to practice Mathematics**	3.98	0.74
6	**I spend my free time by doing Mathematics exercises**	3.57	1.01
7	**I do Mathematics exercises without lecturers guidance**	3.48	1.00
	Total	3.95	0.85

Table 3. Students' attitude towards Mathematics learning

No	Item	Mean	SD
8	**I give full attention during the Mathematics learning session**	4.26	0.69
9	**I write a formula during Mathematics subject learning session.**	4.19	0.51
10	**I write a brief note when reviewing the Mathematics subject**	3.91	0.78
11	**I understand Mathematics lessons easily**	3.53	0.90
12	**I work hard to solve Mathematics' problem**	4.33	0.69
13	**I am prepared to receive constructive comments and advice from my lecturers in relation to my Mathematics subject**	4.60	0.53
14	**I am confident with my own ability and effort in studying Mathematics subjects**	4.19	0.63
	Total	4.14	0.68

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Table 4. Students' learning habit towards Mathematics learning

No	Item	Mean	SD
15	**I have a regular study schedule for Mathematics**	3.22	0.99
16	**Lecture notes are well written and made clear to avoid confusion in Mathematics**	3.93	0.81
17	**In classroom, I always focus on teaching lecturers in Mathematics**	4.26	0.76
18	**I look for additional references to add the information provided by the lecturers in the Mathematics subjects class**	3.76	0.88
19	**I ensure quiet environment study so as not to disturb the focus of Mathematics learning**	3.91	0.73
20	**I can remember Mathematics lessons by doing the exercises over and over again**	4.28	0.72
21	**I often try out Mathematics questions to familiarize myself with the usual question form during Mathematics test and exam**	4.00	0.77
	Total	3.91	0.81

Table 5. Relationship between students' interest, attitude and habit in Mathematics learning

		Interest	Attitude	Habit
Interest	Pearson Correlation	1	0.821*	-0.193
	Sig. (2-tailed)		0.023	0.678
	N	7	7	7
Attitude	Pearson Correlation	0.821*	1	0.143
	Sig. (2-tailed)	0.023		0.760
	N	7	7	7
Habit	Pearson Correlation	-0.193	0.143	1
	Sig. (2-tailed)	0.678	0.760	
	N	7	7	7

Effective learning style for student that contribute to a better and easy understanding in Mathematics subjects is through a repeated exercise. This is supported by the study conducted by (Arsaythamby & Hashim, 2009), stating that students' readiness was not only to obtain certain aspects of Mathematics, but also to study the theorems, rules and definitions and to make Mathematical exercises. A study from (Palanisamy & Arunachalam, 2019) indicated there is significant relationship between learning habits and Mathematics academic performance.

Furthermore, a research conducted by (Vikhrova, 2017) state that the effectiveness of learning can be evaluated from the success of teaching goals, in terms of minimum time and effort to succeed. Findings of this study are parallel with the findings from (Lo & Hew, 2020) where the level of interest in Mathematics is high. Educators must be prepared to implement suitable developments and cultures in teaching strategies by providing basic information, involving students to practice and apply relevant skills and implement it in fitting time (Hashim, *et al.,* 2018).

Association between variables were indicated by the relationship between students' interest and attitude in learning Mathematics. Findings indicated that students' interest in learning Mathematics

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subject have influenced in students' attitude in learning Mathematics.

This is supported by (Xu *et al.,* 2016) where it is proven that interest have affected on students' attitude in that particular subject. However, this study also found that habit in learning Mathematics does not have relationship with students' interest and attitude in learning Mathematics. This finding is contradicting with the research by (Özsoy *et al.,* 2017) where they stated that there is relationship between study attitudes and study habits in general. This might be due to different subject matter which this study focus, Mathematics.

5. CONCLUSION

Learning Mathematics is a crucial for developing a core fundamental knowledge for most of the education fields, including Science, Technology and Engineering. The inclusion of Mathematics into a packaged of STEM indicating how important it is, in contributing to the development of future students. It has been proven by the findings of this study; an association between attitude, interest and learning habit; and it is believed that these variables had an implication towards students' achievement that yet to be studied.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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