

## The Effects of Attitude Towards Problem Solving in Mathematics Achievements

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**Abstract:** This study aims to investigate the effects of attitude in problem solving towards mathematics achievements of Malaysian Institute of Information Technology (MIIT), Universiti Kuala Lumpur students. In this study, a total of 153 diploma and bachelor students were involved on semester one students. A survey study comprises of one set of questionnaire were used to collect data. The questionnaire was divided into three dimensions, confidence, patience and willingness. The data is then analyzed using The Statistical Package for Social Science (SPSS). The descriptive and inferential statistics analyses were used to analyze all the research questions. The research findings reveal that the level of patience, confidence and willingness towards problem solving are medium. The findings also shows that there is significant contribution between overall attitude in problem solving and mathematics achievement. On the other hand, the finding shows that there is no significant relationship between gender towards problem solving and mathematics achievements. Finally, the research draws conclusions and recommendations based on students' attitude towards problem solving and finally to develop simulation model to predict students performance in mathematics. It is hoped that the results of this study could serve as a resourceful guideline for future preparation and the ways to improve students' achievement in mathematics.

**Key words:** Attitude, patience, confidence, problem solving in mathematics, mathematics achievement.

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### INTRODUCTION

Mathematics is an important subject to many university students. Some are gifted and may effortlessly pass the subject without much difficulty. However, there are still many students who struggle in learning mathematics. Research has shown that students' achievement may be influenced by attitude towards problem solving. According to Ma and Kishor, (1997) the variable 'attitude' is one of the most important factors that relates to achievement. Borasi (1990) adds that the conceptions, attitudes, and expectations of students regarding mathematics and mathematics teaching have been considered to be very significant factor underlying their school experience and achievement.

According to Effandi and Normah (2009), a student needs to think and make decisions using appropriate strategies to solve mathematic problems. Patton *et al.*, (1997) propose that learning to solve problems is a primary objective in learning mathematics, as problems are an inevitable fact of life. They add that students' success in achieving their goals encourage them to develop positive attitudes towards mathematics and other problem solving activities. Positive attitudes are assumed to have significant relationship with students' achievement. Therefore, this study seeks to identify the effects of attitude towards problem solving and investigate how these factors contribute to their mathematic achievement.

At UniKL MIIT, there are a few mathematic courses offered to students. These courses are hoped to provide and prepare students with the necessary knowledge so that they can apply them to their area of specialization. Mathematical skill is essential for technical students, hence this study is carried out to identify students' attitude towards problem solving in mathematics and its relationship with their achievement. The research questions posed in this study are as below:

1. What is the students' attitude towards problem solving based on gender?
2. What are the contribution factors in students' attitude towards problem solving and their achievement?

#### **Hypotheses:**

Ho1. There is no significant mean difference between gender and students' attitude towards problem solving.

Ho2. There is no significant contribution factor between attitude towards problem solving and their achievement.

These questions formed two null hypotheses and were tested through inferential and descriptive analyses. The former was tested through T-test and was presented in table of frequency and the latter was tested through Multiple Linear Regression. The findings may help the institute to identify the problem in early semester and find a suitable solution to increase students' achievement of that semester. The results of this study may lead us

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to arrive at a model in developing simulation model for prediction of students' results and to determine the accuracy and reliability of the simulation model.

***Literature Review:***

A considerable amount of literature has been published on attitudes and problem solving in mathematics (Effandi & Normah 2009; Kandemir & Gür 2009; Mapolelo 1998). In education, attitude is one of the important elements which determine students' success. According to Cetingöz and Özkal, (2009) attitudes affect the students' interaction with their friends, families, school and lessons. Therefore, students' attitude towards the course will add to their success.

According to Effandi and Normah, (2009), students' attitudes towards mathematics are very much correlated to their attitude towards problem solving in general. They add that negative attitudes need to be overcome, so that later in life, students will not suffer from poor problem-solving skills. It is important to master problem solving skills as these skills are essential for dealing competently with our everyday life. Their claim is supported by O'Connell (2000) who points out that students must have positive attitude towards problem solving if they are to succeed. He proposes that solving problems requires patience, persistence, perseverance and willingness to accept risks. This concurs with Papanastasiou (2000) claims that students with positive attitude towards mathematics will generally excel at it.

***A. Patience Towards Problem Solving and Mathematics Achievement:***

A study conducted by Faridah, (2004) found that students with high level of perseverance will not stop trying until they manage to get the answer and they will continue to work on a problem until they succeed in solving. Her study reported that most students immediately make an attempt to work out the problem without first planning any strategies to do so which resulted only moderate number of students are able to solve the mathematical questions. Her study indicates that the students have lack of patience to carefully read and understand the questions given. Therefore, her findings indicate that patience towards problem solving is essential to achieve good results in mathematics.

***B. Confidence Towards Problems Solving and Mathematics Achievement:***

According to Education Matters, (2008), students' commitment in mathematics refers to students' motivation to learn mathematics, their confidence in their ability to succeed in mathematics and their emotional feelings about mathematics. Students' commitment in mathematics plays a key role in the acquisition of math skills and knowledge (Education Matters 2008). Therefore, confidence towards problem solving is believed to play a significant role in mathematics achievement and might be one of the factors that influence students in mathematics achievement.

Andrew, Salamonson and Holcomb (2009:218) further highlight that Bandura, (1977) claims that an individuals' self-efficacy expectation of their individual ability to successfully perform a given task is a reliable predictor of whether or not they will attempt the task, the amount of effort they will expend and their level of perseverance in the face of unanticipated difficulties. Past studies show that self efficacy has been used in the evaluation of performance in a variety of academic areas but a major focus has been related to mathematical skills (Kranzler & Pajares 1997).

In a study conducted by Tooke and Lindstrom, (1998), finding shows that confidence in learning mathematics and problems solving is essential to ensure excellent achievement. Therefore, it can be assumed that confidence plays an important role in mathematics achievement.

***C. Willingness Towards Problems Solving and Mathematics Achievement:***

Students who have high level of positive attitude in mathematics will have high level of success in life (Took & Lindstrom 1998). Therefore, willingness towards problem solving is believed to play a significant role in mathematics achievement. A study conducted by Mahmud, (2001) found that excellent students have high level of willingness to solve mathematics problems compared to average and weak students (Mahmud Yahya, 2001). His finding is also supported by Faridah (2004) that excellent students have high level of willingness towards problem solving (Mahmud Yahya, 2001; Faridah, 2004).

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**D. Attitude and Gender:**

A study conducted by Moreno and Mayer, (1999) on gender differences in responding to open-ended problem solving questions suggest that males perform better than females on solving a problem. This concurs with Fennema's (1985) finding that males perform better than females when tasks involve the cognitive skills used in mathematics. Effandi and Normah (2009) claim that students believe that males are more successful at mathematics than their female counterpart. According to Gallagher and Lisi, (1994) male students are able to solve implicit problems and problems that do not require specific strategies.

In Patterson *et al.*, (2003) study, they found male students have a more positive attitude towards mathematics than female students.

On the other hand, however, Mokhtar, (2000) found that there was no significant difference in mean problem-solving achievement between male and female students. This concurs with several other studies which report no significant difference for students' attitude towards problem solving with respect to gender (Effandi & Normah 2009; Hyde *et al.*, 1990; Popoola, 2000). However, several past studies demonstrate that males tend to perform better than females in mathematics (Patterson *et al.*, 2003; Osafehinti, 1988). This performance difference is apparent in difficult subjects such as mathematics and physics (Effandi & Normah, 2009).

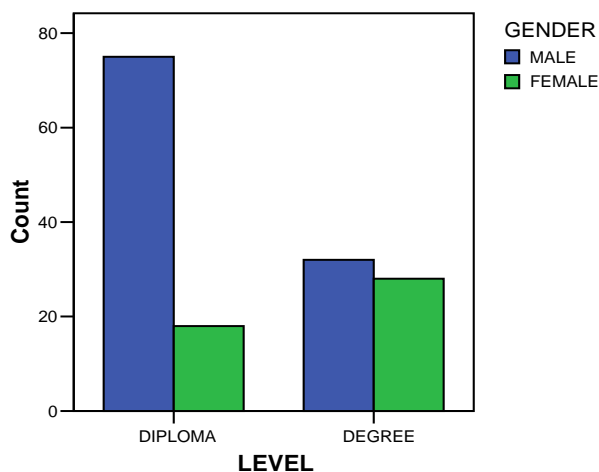
**Research Method:**

This study is a survey study and was conducted at Malaysian Institute of Information Technology (MIIT), Universiti Kuala Lumpur (UNIKL) during the January- June 2011 semester. According to Tuckman (1978), using a survey method is one the effective ways to gather data from the respondents (Tuckman, B.W. 1978). The Student Attitude Questionnaire used was adopted from Charles, Lester and O'Daffer, (1997) and was translated by Effandi, (2003). With Alpha Cronbach reliability analysis technique conducted by Effandi, the instrument shows high reliability as the overall Alpha Cronbach coefficient value is 0.9. Pilot test was also carried out in the early of the semester on 30 students to test the reliability of the instrument. The instrument shows a high reliability as the value of Alpha Cronbach is 0.720. The instrument was divided into three factors; confidence, patience and willingness. Likert scale 4 was used and scores were labeled from 1 to 4. (1-totally disagree, 2-disagree, 3-agree and 4-totally agree). The instrument was administered to 153 first semester students in the middle of the semester using random sampling. The response rate from the respondents was 100% as it was administered during class with a duration of 30 minutes given to answer the questionnaires. Of these numbers, 93 were from diploma and 60 were bachelor students. The data was then analysed using the Statistical Package for Social Science (SPSS). The descriptive and inferential statistics analyses were used to analyse all the research questions.

**Results:**

**A. Respondents:**

The sample comprises a total of 153 diploma and degree students of various programs. The distribution of respondents by level and gender of studies is illustrated in Figure 2. From the total number of respondents, 61% of students were from diploma programs, while the remaining were students of degree programs. There were 70.% male and 30% female students involved in this study.



**Fig. 1:** The number of respondent who participated in the survey by gender and level.

**Gender Frequency According To Programme:**

**Table 1:** The number of male and female students who involved in this research according to the programme is also shown in table 1.

| Programme | Respondents   |  | Gender    |            |
|-----------|---------------|--|-----------|------------|
|           | Frequency (%) |  | Male (%)  | Female (%) |
| Diploma   | 93 (60.8)     |  | 75 (80.6) | 18 (19.4)  |
| Bachelor  | 60 (39.2)     |  | 32 (53.3) | 28 (46.7)  |

From Table 2 below, the level of variables in this study, (confidence, patience and willingness) are based from the range of minimum score and maximum score [28] Jamil, 2001.

**Table 2:** Level Of Variables.

| Mean Score  | Level  |
|-------------|--------|
| 1.00 – 2.33 | Low    |
| 2.34 – 3.66 | Medium |
| 3.6 – 5.00  | High   |

Table 3 shows the level of confidence, patience and willingness towards problem solving. It is shown that the level of patience, confidence, willingness and overall attitude towards problem solving are medium. Moreover, attitude still can be polished to the optimum level.

**Table 3:** Mean And Standard Deviation Of The Variables.

| Variables                                 | Mean | Standard Deviation | Level  |
|---|------|--------------------|--------|
| Patience towards problem solving          | 2.75 | 0.379              | medium |
| Confidence towards problem solving        | 2.38 | 0.389              | medium |
| Willingness towards problem solving       | 2.70 | 0.360              | medium |
| Attitude(overall) towards problem solving | 2.59 | 0.289              | medium |

**B. T-Test:**

In this study, 0.05 significant level was set as an indicator. Based on Table 4 indicates that the p-value is more than 0.05. Since the p-value is more than 0.05, it can be concluded as acceptance of hypothesis 1. As such, there is no significant difference between gender and attitude towards problem solving. In other words, the level of attitude towards problem solving amongst male and female are equal.

**Table 4:** The Summary Of Independent T-Test Based On Gender.

| Gender | N   | mean | sd    | t    | *p    |
|--------|-----|------|-------|------|-------|
| Male   | 107 | 3.21 | 0.279 | .502 | 0.616 |
| Female | 46  | 3.23 | 0.265 |      |       |

**C. Multiple Linear Regression:**

The table below summarizes Multiple Linear Regression test results between overall attitude towards problem solving and mathematics achievement.

**Table 5:** The Summary Of Multiple Linear Regression Test Between Overall Attitude Towards Mathematics Achievement.

| model    | F      | sig  | unstandardized coeffi cients | standardized coefficients | r <sup>2</sup> | %   |
|----------|--------|------|------------------------------|---------------------------|----------------|-----|
| patience | 12.341 | 0.01 | B Std error                  | Beta                      | 0.044          | 7.6 |
| constant |        |      | 8.159 12.757                 | 0.275                     |                |     |

According to Alias (1997), multiple regression is used where we can predict one variable on the basis of several other variables. It is also a statistical approach to modeling the linear relationship between independent variables and dependant variables. Therefore, multiple regression is used in this study to test the hypothesis to see how many and which set of variables is influencing and effect our students achievement in mathematics.

In this study, 0.001 significant level was set as an indicator. The table above illustrates the information of the result analyzed. Based on the test result on the attitude, it shows that patience is a significant factor that contribute to the prediction model of the mathematics achievement. (F = 12.341, significant= 0.001). Therefore, it can be concluded as rejection of hypothesis 2. In contrast, test result on confidence and willingness does not show the significant factor that contribute to prediction model of the mathematics achievement. Also, test result shows that 7.6% variation in achievements can be explained by patience, confidence and willingness. However, patience contributes significantly to the prediction model of mathematics achievement, and 92.4% are other factors that might contribute to their achievement. (Pallant, 2007). From the finding, the prediction model can be written as the following linear equation :  $y = 8.159 + 0.275x_1 + 12.757$

where:  $y$  = mathematics achievement  
 $x$  = patience  
 constant = 8.159  
 standard error = 12.757

**Table 6:** Variance Analysis.

| Model |            | Sum of Squares | df  | Mean Square | F      | Sig. |
|-------|------------|----------------|-----|-------------|--------|------|
| 1     | Regression | 5711.818       | 1   | 5711.818    | 12.341 | .001 |
|       | Residual   | 69887.460      | 151 | 462.831     |        |      |
|       | Total      | 75599.278      | 152 |             |        |      |

From the above table, it is shown that patience ( $F = 12.341$ ,  $\text{sig} = 0.01$ ) seems to be significant factor that contribute to the prediction model of mathematics achievements. However, confidence and willingness did not contribute significantly to the prediction model of mathematics achievements.

#### V. Discussion and Conclusion:

From the analysis of data, it was found that there is no significant difference between gender and attitude towards problem solving. The finding of this study concurs with Mokhtar, (2000), Effandi and Normah (2009), Hyde *et al.*, (1990) and Popoola, (2000). This may be because equal attention is given to students, regardless of their gender Effandi & Normah (2009). Therefore, students' attitude towards problem solving in mathematics was not influenced by gender.

The second finding of this study supports Faridah, (2004) who suggests that patience towards problem solving is essential to achieve good results in mathematics. Based on the finding, it could be assumed that the level of patience plays an important role in the effect of students' mathematics achievement.

The finding also shows that there is significant contribution factor exist in attitude towards problem solving and mathematics achievement. This also supports Affendi who says that positive attitude towards problem solving plays an important role to determine the success in life.

Our future work is to develop simulation model to measure the level of confidence, patience, willingness and overall attitude towards problem solving and mathematics achievement. It is also to compare the findings of the survey and the actual mathematics results of the factors that influence and affect our students in mathematics achievement.

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