

The Effect Of Students Attitude Toward Mathematics For Mathematics Achievement In Indonesia

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Abstract

This paper considers the result of the trends in international mathematics and science study (TIMSS) 2011 assessment conducted in Indonesia. The average mathematics achievement in Indonesia eighth grades have made average scale score of 386 points and with this achievement have indicated that students in Indonesia have typically scored below international averages. Therefore, analyses were undertaken using the Lisrel software to examine the effect of students attitude toward mathematics for mathematics achievement. The dependent variables consisted of the five plausible value calculated for each student as a measure of mathematics achievement, there are labelled BSMMAT01 through BSMMAT05. And independent variables consisted of the students attitude toward mathematics, there are labelled BSDGSLM, BSDGSVM and BSDGSCM.

Students attitude toward mathematics consisted of the three items, there are students like learning mathematics (BSDGSLM), students value mathematics (BSDGSVM) and students confident in mathematics (BSDGSCM). Results of multivariate analyses has shown a strong positive relationship between student attitude toward mathematics and their mathematics achievement.

Keywords. Student attitude toward mathematics, mathematics achievement.

Introduction

Attitudes toward mathematics can be defined as a concept of how an individual to think, act, and behave. Students' success in mathematics depends upon attitude towards mathematics, factors that affect student success in learning comes from internal and external factors. Students' attitudes toward mathematics is one of the internal factors that affect mathematics achievement.

Kulm (1980) suggests that 'It is probably not possible to offer a definition of attitude toward mathematics that would be suitable for all situations, and even if one were agreed on, it would probably be too general to be useful'.

The purpose of this study was to to examine the effect of students attitude toward mathematics for mathematics achievement using data from the Trends in International Mathematics and Science Study (TIMSS) 2011 in Indonesia.

Data source

Data from the Trends in International Mathematics and Science Study (TIMSS) 2011. TIMSS contains international results in mathematics presents extensive information on student performance in mathematics. TIMSS was originally conducted in 1995 and continue every four years, in 1999,2003,2007 and most recently in 2011. The TIMSS 2011 database contains achievement data and student, home, teacher and school background data collection in the 63 countries and 14 benchmarking participants including three canadian provinces, nine us state and two emirates from the united arab

emirates. Fifty-two countries and seven benchmarking participants administered the fourth grade assessment and 45 countries and 14 benchmarking participants administered the eighth grade assessment.

In each county, representative samples of approximately 4000 students from 150-200 schools participated in TIMSS 2011 at each grade assessed. In total, more than 300,000 students participated in the TIMSS 2011 fourth grade assessment and a further 300,000 in the eighth grades assessment. For this study, the following database from TIMSS 2011 for eighth grade were used students' attitudes toward mathematics and their mathematics achievement.

Table 1. Average score achievement in mathematics cognitive domain for student's Indonesia

| Average score | | | | |
|---------------------|--------|---------|----------|-----------------|
| Overall mathematics | Number | Algebra | Geometry | Data and chance |
| 386 | 375 | 392 | 377 | 376 |

Table 2. Average score achievement in mathematics content domain for student's Indonesia

| Average score | | | |
|---------------------|---------|----------|-----------|
| Overall mathematics | Knowing | Applying | Reasoning |
| 386 | 378 | 384 | 388 |

Source: TIMSS 2011

Participant

At the grade level has a range of 0 – 1 (although student performance typically ranges between 300 and 700). The scale center point of 500 was set to correspond to the mean of the overall mathematics achievement and 100 points on the scale was set to correspond to the standard deviation. According to the TIMSS 2011 report, mathematics assessment consisted of content and cognitive domains. There are four content domains, numbers, algebra, geometry, data and chance, whereas knowing, applying and reasoning were assessed in the cognitive domain.

In the study, the targeted sample at the eighth grade in Indonesia country. Total the participants was 5795 students showed in table 3.

Table 3. Summary of the samples included in the study

| Country | Number of student | | | Number of schools |
|-----------|-------------------|--------|------|-------------------|
| | Total | Female | Male | |
| Indonesia | 5795 | 2972 | 2823 | 153 |

Instruments

The following items were selected from the TIMSS 2011 about students attitude toward mathematics are:

1. Students like learning mathematics
2. Students value mathematics
3. Student confidence with mathematics

The item students like learning mathematics labelled BSDGSLM, a three point scale was used the item (1= like learning mathematics, 2 = somewhat like learning mathematics, 3 = do not like learning mathematics), the item students value mathematics labelled BSDGSVM, a three point scale was used the item (1= value, 2 = somewhat value, 3 = do not value) and the item student confidence with mathematics labelled BSDGSCM, a three point scale was used the items (1 = confident, 2 = somewhat confident, 3 = not confident).

Students like learning mathematics scale addressed to measure students' interest and liking of learning mathematics, students value mathematics scale addresses students' attitudes about the importance of the subject and usefulness of the subject, sometimes called attainment value and utility value (Wigfield & Eccles, 2000) and the student confidence with mathematics scale assesses students' self-confidence or self-concept in their ability to learn mathematics.

To assess mathematics assessment is based on a comprehensive framework developed collaboratively with the participant countries, the way to measure student's mathematics achievement on that scale in the TIMSS 2011 had five plausible variables which explained mathematics achievement, there are labelled BSMMAT01 through BSMMAT05.

In table 4 shows the mean and standard deviations of item for measure of students attitude toward mathematics and their mathematics achievement.

Table 4. Descriptive Statistics

| Instruments | Mean | Std. Deviation |
|---|----------|----------------|
| Students attitude toward mathematics | | |
| Students like learning mathematics | 1.93 | .541 |
| Students value learning mathematics | 1.78 | .575 |
| Student confidence with mathematics | 2.47 | .543 |
| Mathematics achievement. | | |
| 1st plausible value mathematics | 400.9769 | 82.94193 |
| 2nd plausible value mathematics | 400.3401 | 83.98521 |
| 3rd plausible value mathematics | 400.6655 | 83.94974 |
| 4th plausible value mathematics | 400.1713 | 83.33684 |
| 5th plausible value mathematics | 400.3396 | 83.79095 |

Statistical analysis

The analysis data used by SPSS and Lisrel software. The analysis is conducted through a regression linear used determine whether there are effect between student attitude toward mathematics and their mathematics achievement

Table 5. Summary of the missing respondents

| Instruments | Missing | Total |
|---|---------|-------|
| Students attitude toward mathematics | | |
| Students like learning mathematics | 64 | 5731 |
| Students value learning mathematics | 61 | 5734 |
| Student confidence with mathematics | 59 | 5736 |
| Mathematics achievement. | | |
| 1st plausible value mathematics | 0 | 5795 |
| 2nd plausible value mathematics | 0 | 5795 |
| 3rd plausible value mathematics | 0 | 5795 |
| 4th plausible value mathematics | 0 | 5795 |
| 5th plausible value mathematics | 0 | 5795 |

The student questionnaire seeks information about students attitude toward mathematics. From total of the 5795 students and 184 items are missing or no response in filling the all questionnaires from labelled BSDGSLM, BSDGSVM and BSDGSCM about students attitude toward mathematics.

Results

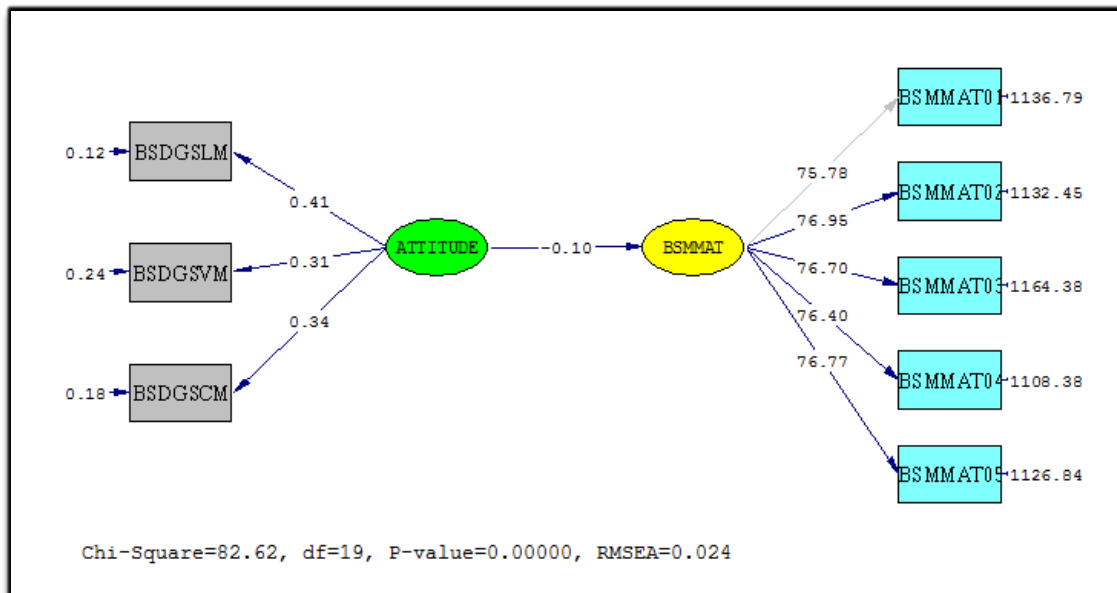


Figure 1. Estimates Basic Model

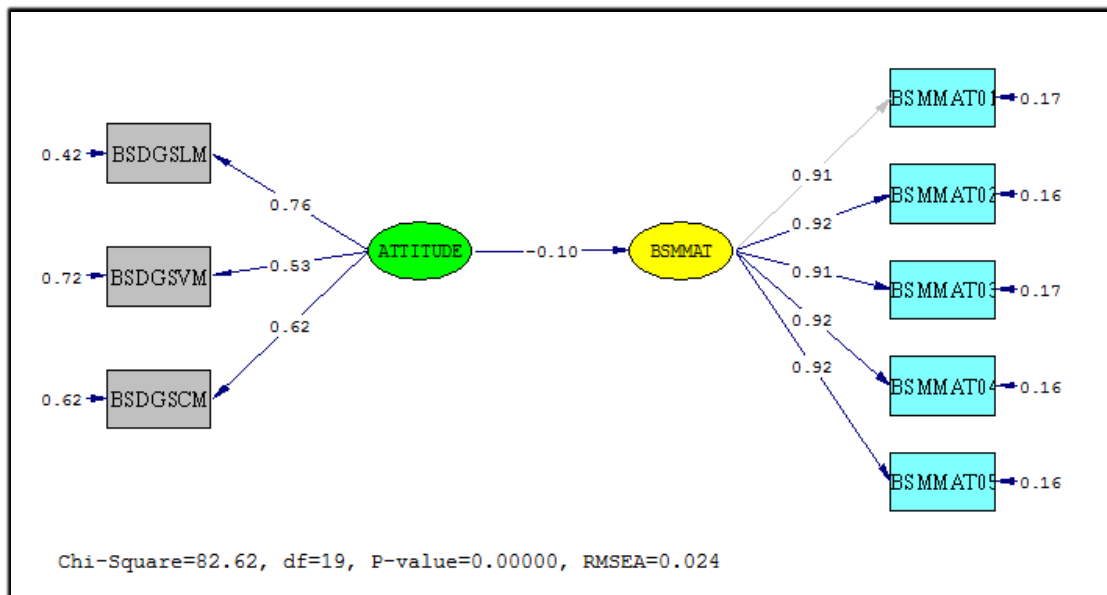


Figure 2. Standardized Solution Basic Model

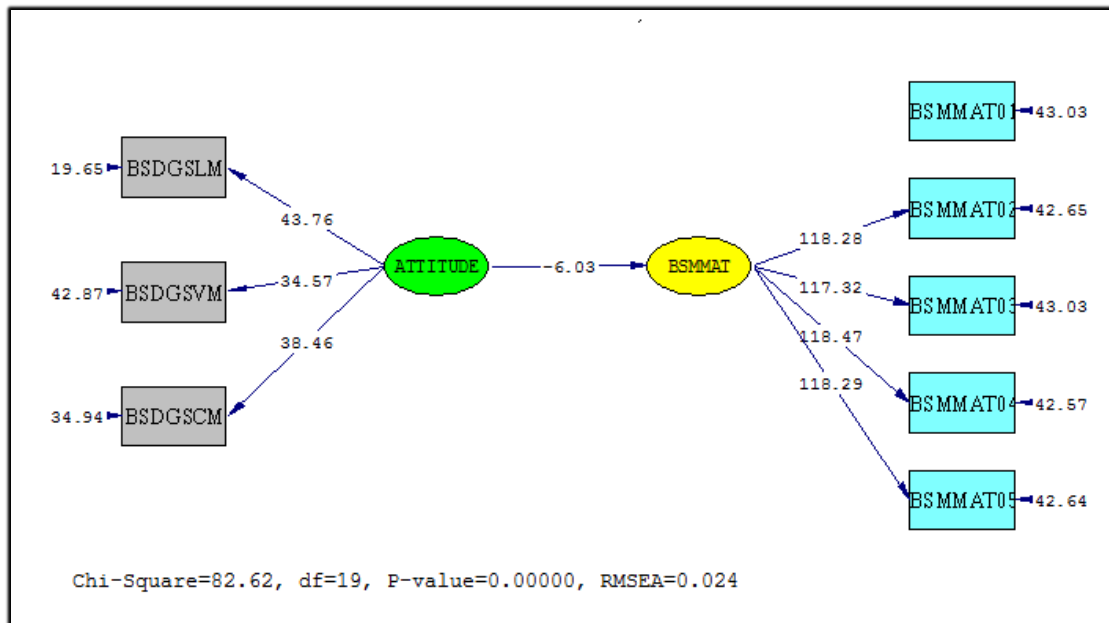


Figure 3. t-value Basic Model

Based Figure 3 above showed that attitude (ATTITUDE) t value of 6,03 > 1,96, it's mean show that has effect toward mathematics achievement (BSMMAT).

LISREL Estimates (Maximum Likelihood)

Measurement Equations

| | | |
|--|---------|---------|
| BSMMAT01 = 75.78*BSMMAT, Errorvar.= 1136.79, R ² = 0.83 | (26.42) | 43.03 |
| BSMMAT02 = 76.95*BSMMAT, Errorvar.= 1132.45, R ² = 0.84 | (0.65) | (26.56) |
| | 118.26 | 42.64 |
| BSMMAT03 = 76.70*BSMMAT, Errorvar.= 1164.38, R ² = 0.83 | (0.65) | (27.06) |
| | 117.31 | 43.03 |
| BSMMAT04 = 76.40*BSMMAT, Errorvar.= 1108.38, R ² = 0.84 | (0.64) | (26.04) |
| | 118.46 | 42.56 |
| BSMMAT05 = 76.77*BSMMAT, Errorvar.= 1126.84, R ² = 0.84 | (0.65) | (26.43) |
| | 118.28 | 42.64 |

$$\text{BSDGSLM} = 0.41 * \text{ATTITUDE}, \text{ Errorvar.} = 0.12, R^2 = 0.58$$

| | |
|----------|----------|
| (0.0094) | (0.0063) |
| 43.76 | 19.65 |

$$\text{BSDGSVM} = 0.31 * \text{ATTITUDE}, \text{ Errorvar.} = 0.24, R^2 = 0.28$$

| | |
|----------|----------|
| (0.0089) | (0.0055) |
| 34.57 | 42.87 |

$$\text{BSDGSCM} = 0.34 * \text{ATTITUDE}, \text{ Errorvar.} = 0.18, R^2 = 0.38$$

| | |
|----------|----------|
| (0.0087) | (0.0052) |
| 38.45 | 34.93 |

Structural Equations

$$\text{BSMMAT} = -0.096 * \text{ATTITUDE}, \text{ Errorvar.} = 0.99, R^2 = 0.0093$$

| | |
|---------|---------|
| (0.016) | (0.022) |
| -6.03 | 45.05 |

Conclusion

Data analysis indicated that a strong positive relationship between student attitude toward mathematics and their mathematics achievement

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