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# PROCEEDING

The First International Conference on Maritime Development
Tanjungpinang, Indonesia, September 4-6, 2015
Organized by Universitas Maritim Raja Ali Haji

# Empowering Maritime Resources beyond Asia: Directions, Issues and Challenges


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Satria Agust
Gatot Subroto
Risandi Dwirama Putra
Eko Prayetno
L.N. Firdaus

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# Preface

Indonesia have declared itself will become the world maritime axis under the leadership of elected president 2014-2019. It means the transformation of Indonesia five years forward will be placed on maritime strength as national development foundation. Therefore, either through geographical or non-geographical, it will happen development paradigm shift from continent-based to maritime-based which covers some development aspects such as politic, economy, social, culture, law, security and defense.

Geographical configuration of Indonesia as the biggest archipelagic country in the world has carpeted the width of 5.8 million km of sea, 3.2 million $km^2$ of territorial sea, 2.7 million km2 with total length of Indonesia coastline 54.716 km which is spreading out as long as Indian Ocean, Strait of Malacca, South China Sea, Java Sea, Celebes Sea, Molucca Sea, Pacific Ocean, Arafura Sea, Timor Sea, and other small regions. The comparison of territorial sea area with ZEE equals to 2:3. This represents the objective condition of geographical potencies as basic policy determination of political development of Indonesia to become a maritime axis. Geographical premises of Indonesian archipelago which is between Pacific and Indian Ocean and also between Asia and Australia Continent stores abundant natural resources potencies, either in land, sea, or air. These will be able to be exploited to develop Indonesian strength as the world maritime axis.

The attainment of Indonesian vision as the world maritime axis requires the right policies, strategic and action oriented so that the abundant maritime potencies can be empowered as optimal as possible. This can be used for developing Indonesia to become a big, strength and prosperous country based on the objective condition as archipelago country with abundant maritime assets. The reality nowadays shows that this very rich Indonesia of natural as if "natural resources damnation" (The paradox of Plenty). Potential losses of oceanic of Indonesia appraised up to 300 billion rupiah per year through illegal fishing. This perspective inspires Universitas Maritim Raja Ali Haji to take the initiative to carry out the 1st International Conference on empowerment of maritime potencies in Asia region.

On behalf of the Organizing Committee for the 1st International Conference on Maritime Development (ICMD 2015), I would like to express our sincere thanks to all the members of the ICMD 2015 Organizing Committee and sponsors for their kind support and help. We warmly welcome all the participants of the conference to Tanjungpinang. I hope everybody will enjoy their stay in Tanjungpinang.

Chairman,
Organizing Committee of
The 1st International Conference on Maritime Development (ICMD 2015)

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## Maritime Education

# Mathematics Achievement of Indonesia Eighth Grade Students And Characteristics of Mathematics Curriculum

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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. 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. The best average score was achieved in the content domain of "Algebra" and the lower score of "Number". And the best average score was achieved in the cognitive domain of "Reasoning" and the lower score of "Knowing". Therefore, analyses were undertaken using the SPSS software to examine mathematics achievement and characteristics of mathematics curriculum. The variables consisted of the content domain value calculated for each student as a measure of mathematics achievement.

**Keywords**: content domain, cognitive domain, mathematics achievement

## 1. Introduction

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 Uni Emirates Arab. 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 their mathematics achievement. Indonesia did not participate in TIMSS 1995, 1999 and 2003.

The poor quality of mathematics education in Indonesia can be traced in the low achievement level reached by the students in other countries. In the 2011 Trends in International Mathematics and Science Study, Indonesia ranked 38$^{th}$ out of the 63 countries participating in this study. The Indonesian performance was significantly lower than ASEAN country as Singapore, Malaysia and Thailand (Rahmatina, 2014). The mathematics content and skill tested in TIMSS represent what the participating counties considered important to be learned at school up to eighth grade. The curriculum refers to the provision of differentiated instruction to accommodate students with different abilities. Curriculum is a set of tools to achieve educational goals, as well as guidance in the implementation of education. Curriculum can show the system plans and arrangements regarding the content and learning materials are guided in learning activities. The Government is obliged to establish and organize a national education system for all Indonesian citizens. Since 1945, the national curriculum has changed; start in 1947, 1952, 1964, 1968, 1975, 1984, 1994, 1999, 2004, 2006, and most recently in 2013. Like other countries, education system in Indonesia are managed or under the jurisdiction of the government. The information about age of entry, promotion and retention in TIMSS 2011 that children must be 7 years old by the end of June to begin on July 12th, although parents have some choice in starting children at age 6. Students are required to sit for the national examination; this examination is called *Ujian Nasional* (UN) before they could proceed to high education.

## 2. Methodology

This paper uses Trends in International Mathematics and Science Study (TIMSS) 2011 data. 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 variable used this analysis include content domain of the mathematics achievement, there are Algebra, Geometry, Number, data and Chance by the average of

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five value in the content domain. The study continues of the curriculum on mathematics achievement. This study will employ the t-test to analyze significant differences based on the sex of the students. It also used ANOVA to relate each of these content domains. In the study, the targeted sample at the eighth grade in Indonesia country. Total the participants were 5795 students showed in table below.

**Table 1**. Summary of the samples included in the study

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

## 3. Result

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.

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

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

Source: TIMSS 2011

**Table 3**. Average score achievement in mathematics cognitive domain for student's Indonesia

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

Source: TIMSS 2011

Table 2 above presents the average score achievement in mathematics content domain shown that Algebra has the average score higher than other content domain and the lowest achievement in the content domain of Number. Analyzing student's achievement through cognitive domain, we can see in table 3 shown that the Indonesia students were the most successful of Reasoning.

In table 4 show the result for the 4 countries that statistics descriptive for the eighth grade included Indonesia, Malaysia, Singapore and Thailand. The result shows that Singapore which had higher average mathematics achievement than all ASEAN counties.

Tabel 4. Statistics descriptive of mathematics achievement in ASEAN country 2011

| Country | Algebra | | Data and chance | | Number | | Geometry | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Mean | Std. Deviation | Mean | Std. Deviation | Mean | Std. Deviation |
| Indonesia | 405.5145 | 77.11866 | 390.1982 | 79.94800 | 390.7927 | 84.95021 | 393.1353 | 90.99990 |
| Malaysia | 430.9154 | 85.58763 | 429.9734 | 86.52171 | 451.7141 | 95.07406 | 432.9860 | 104.46935 |
| Singapore | 610.8772 | 87.43590 | 603.1265 | 95.23595 | 607.9082 | 76.71987 | 606.0014 | 80.79848 |
| Thailand | 439.2915 | 89.64875 | 443.9083 | 81.22564 | 440.7781 | 96.14792 | 429.8392 | 92.55418 |

Trend in mathematics achievement at the eighth grade in 1995, 1999, 2003, 2007 and 2011 can be seen in figure 1. One of the main reasons for lowest average achievement mathematics of the Indonesia students in content domain comes from the subject matter to these domains is insufficiently of mathematics curriculum for Indonesia high school.

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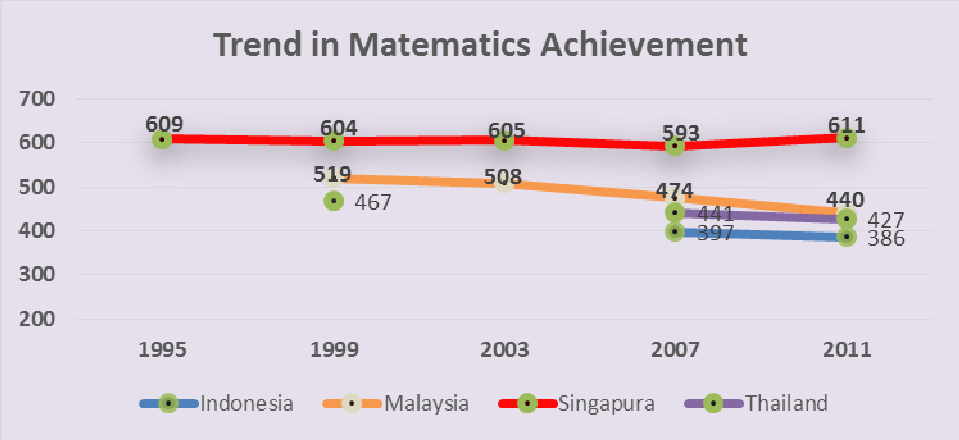


**Figure 1**. Trend in Mathematics Achievement

## 4. Gender difference in Mathematics Achievement

There are some differences between boy's and girl's achievement of the contain domain, In table 5 present that girl's average score higher than boy's students or girls have better results than boy's in the eighth grade students of the Indonesia. The gender differences, we can perceive on statistically significant gender differences in Table 6. Based on the analyze shown in those contain domain subject as Number, Algebra, Geometry and data and chance with significant value (sig = 0,000 < 0,05). We can conclude that there are difference significant between girls and boys in achievement mathematics.

**Table 5.** Group Statistics

| | *SEX OF STUDENTS* | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Number | GIRL | 2972 | 396.1345 | 83.79627 | 1.53709 |
| | BOY | 2823 | 385.1689 | 85.80448 | 1.61493 |
| Algebra | GIRL | 2972 | 415.5746 | 76.19482 | 1.39766 |
| | BOY | 2823 | 394.9235 | 76.67933 | 1.44319 |
| Geometry | GIRL | 2972 | 397.4278 | 89.03467 | 1.63318 |
| | BOY | 2823 | 388.6163 | 92.82551 | 1.74708 |
| Data and Chance | GIRL | 2972 | 394.8683 | 78.03399 | 1.43139 |
| | BOY | 2823 | 385.2818 | 81.64032 | 1.53656 |

**Table 6.** Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Lower | Upper |
| Number | Equal variances assumed | .020 | .887 | 4.921 | 5793 | .000 | 6.59759 | 15.33357 |
| | Equal variances not assumed | | | 4.918 | 5760.506 | .000 | 6.59493 | 15.33624 |
| Algebra | Equal variances assumed | .135 | .713 | 10.281 | 5793 | .000 | 16.71323 | 24.58888 |
| | Equal variances not assumed | | | 10.279 | 5773.721 | .000 | 16.71258 | 24.58952 |
| Geometry | Equal variances assumed | 4.118 | .042 | 3.688 | 5793 | .000 | 4.12820 | 13.49486 |
| | Equal variances not assumed | | | 3.684 | 5743.260 | .000 | 4.12317 | 13.49989 |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Data and Chance | Equal variances assumed | 3.825 | .051 | 4.570 | 5793 | .000 | 5.47452 | 13.69845 |
| | Equal variances not assumed | | | 4.565 | 5739.519 | .000 | 5.46974 | 13.70324 |

To analyze differences between the Indonesian students achievement across content domain can be analyzed by used Tukey test in Analyze of Variance (ANOVA).

**Table 7.** Test of Homogeneity of Variances

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| 46.680 | 3 | 23175 | .000 |

The Levene's test of equality of error variances tests the assumption of ANOVA that the variances of mathematics achievement variables are equal across the content domain. As can be seen in Table 7 mathematics achievement are significant (sig = 0.00 <0.05), the indicates that tests the null hypothesis that the error variance of the mathematics achievement variables is no equal content domain, whereas ANOVA is robust so next analysis can be continue.

**Table 8.** ANOVA

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 896202.717 | 3 | 298734.239 | 42.927 | .000 |
| Within Groups | 1.613E8 | 23175 | 6959.188 | | |
| Total | 1.622E8 | 23178 | | | |

Mathematics achievment differed significantly among the four content domain , the value of the test F = 42,927 is greater that the critical value of F =2,605 and sig value is 0,000 < 0,005. We conclude that the mean achievement mathematics by each of the four contains domain is not the same. In other words, at least one of the four means is different from the other three. The result from the analyze ANOVA test do not indicate which of the four differ from one another, it is of interest to follow the analysis multiple comparisons with a post hoc test . The Tukey post hoc test in Table 10 indicated that mathematics achievement of the contain domain in the Algebra differed significantly from contain domain '"Number "(sig = 0,000) less than significant 0,05 level. And Algebra different significantly from the other three Number, Geometry, Data and Change. Based on the above result above can be concluded as present in Table 9.

**Table 9**. Conclusion of the significant

| CONTENT DOMAIN | NUMBER | ALGEBRA | GEOMETRY | DATA AND CHANCE |
|---|---|---|---|---|
| NUMBER | Not related | * | - | - |
| ALGEBRA | * | Not related | * | * |
| GEOMETRY | - | * | Not related | - |
| DATA AND CHANCE | - | * | - | Not related |

*: different significant
- : no different significant

**Table 9**. Multiple Comparisons

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| (I) 1 | (J) 1 | Mean Difference (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| NUMBER | ALGEBRA | -14.7092019* | 1.5498380 | .000 | -18.691074 | -10.727330 |
| | GEOMETRY | -2.3300060 | 1.5498380 | .435 | -6.311878 | 1.651866 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| | DATA AND CHANCE | .6070328 | 1.5498380 | .980 | -3.374839 | 4.588905 |
| ALGEBRA | NUMBER | 14.7092019* | 1.5498380 | .000 | 10.727330 | 18.691074 |
| | GEOMETRY | 12.3791959* | 1.5497711 | .000 | 8.397496 | 16.360896 |
| | DATA AND CHANCE | 15.3162347* | 1.5497711 | .000 | 11.334535 | 19.297935 |
| GEOMETRY | NUMBER | 2.3300060 | 1.5498380 | .435 | -1.651866 | 6.311878 |
| | ALGEBRA | -12.3791959* | 1.5497711 | .000 | -16.360896 | -8.397496 |
| | DATA AND CHANCE | 2.9370388 | 1.5497711 | .230 | -1.044661 | 6.918739 |
| DATA AND CHANCE | NUMBER | -.6070328 | 1.5498380 | .980 | -4.588905 | 3.374839 |
| | ALGEBRA | -15.3162347* | 1.5497711 | .000 | -19.297935 | -11.334535 |
| | GEOMETRY | -2.9370388 | 1.5497711 | .230 | -6.918739 | 1.044661 |

## 5. The Mathematics Curriculum for Indonesia Secondary School

TIMSS went to great lengths to ensure that comparisons of the student achievement across countries would be as fair and equitable as possible (TIMSS 2011). In 2011, Indonesia has been using the Kurikulum Tingkat Satuan Pendidikan (KTSP). KTSP is operational curriculum developed by and implemented in each educational unit. The curriculum structure is a pattern and arrangement of subjects that must be taken by students in learning activities. The depth and breadth of curriculum for each subject at each educational unit contained within the competence that must be mastered by the students according to the study load specified in the curriculum structure. The competency includes standards and basic competencies, which were developed based on competency standards. Local content and self development activities are an integral part of the structure of the curriculum in secondary education. KTSP structure includes: subjects, local content, self-development activities, setting load, the increase in classes, majors and graduation, life skills education, and education based on local and global excellence.

KTSP is replaced with the curriculum of 2013 and implemented in 2014. Curriculum 2013 of the mathematics subject was designed with reference to international standards (PISA, TIMSS,) both breadth and depth. Starting with concrete problems gradually brought to the abstract form (model). Emphasizing the importance of the procedure or algorithm in problem solving. Load balanced between numbers, algebra, geometry, data and chance in each class. Not always be calculated. Emphasize the mastery of pattern number, geometry; algebra is not always exact, can approx. Do not always have complete information to be resolved. Each subject supports all competencies (attitudes, skills, knowledge) and all subjects are taught with the same approach that the scientific approach through observing, ask, present, reasoning, trying.

However, the turn of the newly implemented curriculum 2013 returned back to the curriculum KTSP on the instructions of the government. Furthermore, primary and secondary education minister said that schools that have implemented Curriculum 2013 for the last three semesters still allowed to continue teaching the curriculum. However, if there are schools that object to the curriculum in 2013, may not use the curriculum in 2013.

## 6. Conclusion

Based on the analysis of the above data it can be concluded that there are significant differences in mathematical achievement of the Algebra from the other three Number, Geometry, Data and Change. There are serious flaws that affected the curriculum in Indonesia cause the average mathematics achievement of the Indonesian students lowest than other countries especially in ASEAN countries.

## References


[1] Rahmatina, Desi (2014). The Effect Of Students Attitude Toward Mathematics For Mathematics Achievement In Indonesia. *Prosiding International Seminar on Innovation in Mathematics and Mathematics Education* p.55-62. ISBN : 978-602-1037-00-3

[2] Rahmatina, Desi (2014). Analisis Perbandingan Pencapaian Matematika Siswa Kelas VIII di Negara ASEAN. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika*. p. 78-86. ISBN: 978-602-95343-4-4

[3] Kementrian Pendidikan dan Kebudayaan (2013). Kerangka Dasar dan Struktur Kurikulum 2013.




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[4] TIMSS. (2011). User guide for the international database. International association for the evaluation of education achievement. Http://TIMSS.bc.edu/TIMSS2011/international-database.html
[4] TIMSS. (2011). *Assessment frameworks* . International association for the evaluation of education achievement.. http://TIMSS.bc.edu/TIMSS2011/frameworks.html

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