

An Evaluation of Indonesian Students' Self-Confidence in Learning Mathematics

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Abstract

This research aimed to investigate Indonesian students' self-confidence in learning as one solution for the government to improve Indonesian students' learning outcomes. The research focused on Math because the evaluation result from Trends in International Mathematics and Science Study (TIMSS) showed that Indonesia was in the 39th position in the world in 2007 for Math Excellence, indicating that more effort needs to be made to improve it. The government has approached this issue by improving the education quality and infrastructure; however, it is also necessary to view it from the psychological perspective, particularly from the students' self-confidence in learning. This research was qualitative research. It used TIMSS data analyzed with Latent Class Analysis. The research sample was 4403 students of grade eight from 149 Indonesian schools. The findings showed that there are three categories of students' self-confidence: 1) strong self-confidence (25%), 2) moderate self-confidence (55%), and 3) low self-confidence (20%). Due to a high number of students with a moderate and low level of self-confidence, it is thus advised that the government adopts the psychological approach in education, improve the competencies of teachers and supervisors, and improve teaching and learning methodologies in addition to improving infrastructure so that students' self-confidence in learning can be increased, and the desired learning outcomes can be achieved. Despite focusing on Math, the findings of this study are also applicable to other subjects.

Keywords: Self-confidence, Self-efficacy, Latent Class Analysis.

1. Introduction

Indonesia is a developing country with more than 300 million people. According to the data from Badan Pusat Statistik (2019), around 17% of the Indonesian population consists of students from various school levels. This large proportion has encouraged Indonesia to continuously improve its educational infrastructure so that students can have better learning facilities. One of the Indonesian government's top priorities in the last three decades is to provide good quality school buildings, libraries, laboratory equipment, learning media, and other necessary resources for students (Indonesia Ministry of National Education, 2010).

In addition to improving the educational infrastructure, the government has also been increasing the number of human resources (teachers and supervisors) at school and providing them with training on a regular basis so that their competencies can be upgraded, thus contributing to improving the quality and standard of education (United Nation Development Program, 2010). When schools have competent school teachers and supervisors, it is expected that their competencies can help develop the students' self-confidence and positive attitude towards learning, which will eventually result in good academic attainment (Olson et al., 2008). A systemic approach has also been carried out in this case by the Indonesian government through establishing related ad-hock organizations to ensure that this goal is achieved.

A number of bilateral cooperation in the educational sector has also been established by the government to improve education quality (United Nation for Children Fund, 2010), such as with Australia in a project called Community Participation in an Educational Project (Bailey,

2009), and with the United States in a project called Decentralized Basic Education Project (USAID, 2008). There was also a signed agreement with the United States on a four-year project (2012-2015) called PRIORITAS – Prioritizing Reform, Innovation, Opportunities for Reaching Indonesia’s Teacher, Administrators, and Students (USAID Indonesia, 2012), with a focus on improving class management, instruction delivery, active learning, and learning approaches.

This continuous effort to improve the education sector has led Indonesia to reach a significant achievement in 2007, in which it climbed up from the 55th position in 1999 to 39th position in 2007 in the Math Excellence category, evaluated by Trends in International Mathematics and Science Study (TIMSS). Despite this significant achievement, an ongoing effort is still needed for further improvement.

This research was thus conducted to investigate student’s self-confidence in learning, shedding a light on the root of the issue from the psychological perspective so that a solution can also take this factor into account.

Indonesian Education and The promotion of Math Learning

Math is regarded as an important subject to be taught at schools and universities in Indonesia (Badan Standarisasi Pendidikan Nasional, 2012). It is first introduced to students at the kindergarten level through games using numbers, shapes, and so forth. The students then proceed to learn addition, subtraction, multiplication, and division at primary schools. At junior and secondary schools, they continue to learn algebra and geometry (Mullis et al., 2008). At the end of grade 8th of junior secondary school, students are expected to have accomplished learning math topics, such as fractions and decimals, integers, ratios, proportions, percentages, patterns of algebra, algebraic expressions, equations and formulas, geometry lines and angles, two- and three-dimensional shapes, congruence and similarity, symmetry and transformations, data collection and organization, data representation, data interpretation and uncertainty and probability (Mullis et al., 2008). Some statistical calculation is also introduced to a particular mainstream of study at senior secondary school students. At the university level, students are re-introduced to some basic math concepts which can be applied to their research project. For those majoring in Math or Math-related degrees, such as math education, economics, and statistics, learning deep math concepts and doing practices are their core activities (Indonesia Ministry of National Education, 2010).

To encourage students to learn Math, the Indonesian government regularly holds math competitions. Those mainly involved in the organization of the activities are educational working groups, such as school committee, school cluster, and teacher working group (*Kelompok Kerja Guru-KKG*) for primary schools; subject-teacher working group (*Musyawarah Guru Mata Pelajaran-MGMP*) at junior and senior secondary schools at the sub-district level; principal working group (*Kelompok Kerja Kepala Sekolah-K3S*); education councils at the district level, education quality control council (*Lembaga Penjamin Mutu Pendidikan-LPMP*); education council at the provincial level, National LPMP and the national council for education standardization (*Badan Nasional Standarisasi Pendidikan-BNSP*) at the national level (Indonesia Ministry of National Education, 2010).

This continuous promotion has made Indonesia one of the countries that highly values math as an important subject for daily life (Olson et al., 2008). Ironically, despite this positive attitude towards math, Indonesia is ranked as one of the countries with the lowest self-confidence on mathematical ability (Olson et. al., 2008). This seems to encourage the Indonesian government to encourage math learning by still maintaining math as one of four tested subjects in the national examination for students at the 6th, 9th, and 12th grade (Rusmar, 2010). This means that the students must pass the exam to graduate and move to a higher schooling system; otherwise, they have to stay in the same school and re-learn math for another year (Rahmi, 2011). Since this policy obliges students to learn math, schools and math

teachers are expected to provide full support, guidance, and necessary resources to students so that their self-confidence in learning math can be established.

Factors Affecting Self-Confidence in Learning

Longman Dictionary of Contemporary English (2012) defines “confidence” (noun) as “the feeling that you can trust someone or something to do what they say”, and “self-confident” (adj) as “one’s feeling that he/she can do things well”. Confidence is also called self-efficacy, which is a positive emotion towards activities to be carried out (Kloosterman, 1988). Unconfidence, in contrast, is a negative emotion towards certain activities. When a person feels confident in learning, he or she feels positive that she can pass the process and achieve the desired results. According to Kloosterman (1988), self-confidence is a factor that determines success in learning.

Some researchers argued that confidence is a trait (Bernstein et al., 1994) or a situational specific concept (Brodie et al., 1995), which seems to be influenced by a theory that humans tend to implement what has been set up for them (Bernstein et al., 1994). However, some other researchers believed that confidence is not fixed, which means that it can increase and decrease depending on the circumstances (Norman, 2003). The latter view seems to be based on a theory that humans tend to adjust themselves to the coming stimulus (Brodie et al., 1995). However, too much stimulus is often associated with over-confidence (Heath et al., 2012).

A study done by Norman (2003) found that there are a number of factors causing the decrease in students’ self-confidence, namely newness of the task, identity crisis, task requirement overestimation, one’s physical characteristics, the feeling of inferiority, lack in perceived knowledge, negative thinking, fear for judgment, and the feeling of uncertainty about success. In addition, racial-, gender-, and social-class stereotypes can also affect students’ self-confidence in learning (Newcombe et al., 2009). Lucariello (2010) thus suggests that teachers should identify their students’ perceptions of the teaching and learning process beforehand in order to find a suitable solution that does not deteriorate the students’ self-confidence.

On the other hand, the factors associated with an increase in students’ self-confidence are good learning experiences, the feeling of security, positive feedback, realism, positive social interaction, familiarity, support, encouragement, relaxation, reassurance, self-management, good stress management, respect, and appreciation (Norman, 2003). When the students have these, their potential to achieve the set goals is great.

2. Method

The data for this research were collected from TIMSS CQ (2007). The guideline on how to use the data with various coding systems along with reports and manuals was also utilized so that the data would be used in accordance with the TIMSS’s Technical Report (Olson et al., 2008). 4403 students were used as samples from grade 8 to represent the population from 149 Indonesian schools.

Table 1: Data of Students’ Self-Confidence from TIMMS’s Database (2007)

Respondent	Answer	Error	Correct Answer
Female	2178	79	2099
Male	2225	284	1941
Total	4403	363	4040

Having dealt with error data, the cleaned data transform numerical variables to the analysis design prepared for this research. The purpose of the transformation was to change

2=1, 3=2, and 4=2. This transformation procedure referred to TIMMS transformation on the four categories changed into two indexes.

To evaluate students' self-confidence in learning mathematics (SCM), the students were stimulated with four statements: A) I usually do well in mathematics (MAWEL); B) Mathematics is harder for me than for many of my classmates (MACLM); C) I am just not good at mathematics (MASTR); D) I learn things quickly in mathematics (MAQKY).

To look for Latent Class Analysis (LCA), the students chose one out of four options that suited them the most (McCutcheon, 1987) with TIMMS labels; 1) agreed a lot; 2) agreed a little; 3) disagreed a little and; 4) disagreed a lot (TIMSS C.Q, 2007). Thus, the original dimension of this data was 4 x 4 x 4 x 4.

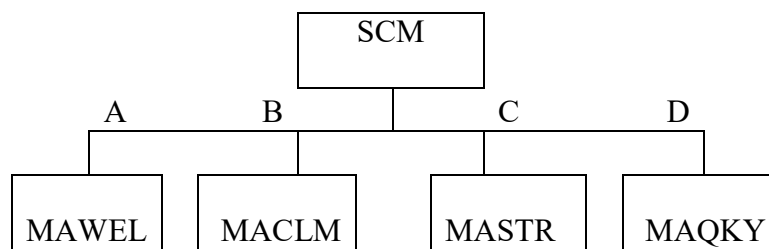


Figure 1. The Research Design for Latent Class Analysis of Students' Self-Confidence

3. Results and Discussions

Students Self-Confidence

To deal with the model fit for the data, some various commands were analyzed to find the best model appropriate for the data. The key results are presented below:

Table 2. Statistic for the Model fit of Students Self-Confidence

Model	(X^2)	(L^2)	(ID)
2-class	564.5040 (0.0000)	499.7243 (0.0000)	0.1200
3-class	14.5879 (0.0001)	14.1286 (0.0002)	0.0126
4-class	14.0217 (0.0000)	13.5138 (0.0000)	0.0100

The model fit above clearly shows that X^2 and L^2 cannot be used for model selection justification because all values on X^2 and L^2 are not > 0.05 . This > 0.05 criterion is a standard criterion for model selection (Vermunt, 1997).

The writer then relied on the index of dissimilarity to determine the model fit for female data. Since the 3-class and 4-class model index of dissimilarity values are < 0.05 , both models can be said to have met the criteria for model selection. However, the author perceived the 3-class is the best choice in this case because it is easier for inferential analysis later.

The 3-class-model latent out-put is presented as follows:

Table 3. LEM Output of Students Self-Confidence

Self-Confidence in Learning Math		Class 1	Class 2	Class 3
		0.2080	0.5504	0.2416
MAWEL	Agree	0.4854	0.9093	0.9209
	Disagree	0.5146	0.0907	0.0791
MACLM	Agree	0.6672	0.6811	0.3405
	Disagree	0.3328	0.3189	0.6595

MASTR	Agree	0.7482	0.9875	0.1076
	Disagree	0.2518	0.0125	0.8924
MAQKY	Agree	0.0122	0.9159	0.9004
	Disagree	0.9878	0.0841	0.0996

Based on the figure above, it shows that Class 1 was a mixed class in which some respondents agreed with statement B and C yet disagreed with statement A and D. In other words, Class 1 consisted of those thinking that “math is harder for them than for many of their classmates” (MACLM) and “I am just not good at mathematics” (MASTR). They also believed that they do not do well in mathematics (MAWEL) and cannot learn things quickly in mathematics (MAQKY). The disagreement for statement D (MAQKY) was marked. The value that this class received was 0.2080, indicating that this class has low self-confidence in learning math.

In Class 2, a unique pattern was found, in which the students believed that they usually do well in mathematics (MAWEL) and learn things quickly in mathematics (MAQKY). Interestingly, they also agreed that mathematics is harder for them than for many of their classmates (MACLM) and that they are just not good at mathematics (MASTR). The value that this class received was 0.5504, indicating that it has moderate self-confidence in learning math.

Class 3 shows that students believed that they usually do well in mathematics (MAWEL) and learn things quickly in mathematics (MAQKY). On the other hand, they did not think that mathematics is harder for them than for many of their classmates (MACLM) and that they are not good at mathematics (MASTR). The value that this class received was 0.2416, indicating that this class has strong self-confidence in learning math.

The findings that many students have low and moderate self-confidence in learning is surprisingly contradictory to the fact that Indonesia is one of the countries with a highly positive attitude towards Math (Mullis et al., 2008). One possible cause for this is that the students favor math, but they do not have adequate support in learning or do not favor the teaching method used by the teachers. Further research is thus necessary to reveal the exact causes.

4. Conclusion

The present study revealed that there are three categories of students' self-confidence: 1) strong self-confidence (25%), 2) moderate self-confidence (55%), and 3) low self-confidence (20%). The proportions of moderate and low self-confidence are quite large, contradicting the fact that Indonesia has a highly positive attitude toward math. Thus, further research is necessary to find out the exact reasons behind such considerable proportions. It is also suggested that the Indonesian government uses the psychological perspective in education along with improving infrastructure and teachers' competencies, which can lead to increased self-confidence of the students in learning math (SCM) and their improved academic achievement. Improving daily classroom management, teaching methodologies and approaches are also expected to be of top priorities of any future educational programs of formal or informal organizations.

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