Assessing of student’s performance and their math test in Islamic school: a Rasch perspective

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Abstract. This research tries to assess the student's ability on math. This research involved 159 students at Islamic Junior High School. We evaluated the student’s ability on math based on basic statistics and geometry. The materials created became 40 items mathematics final exam and has been implemented by students on May, 2018. The data were analysed using the Rasch Measurement Tool (RMT). The results indicated are capable of reaching the final exam (+1.30 logit). Further, determining the diagonal line from the side of a beam is the most blank question for students. Instead, determine the value of the equation to calculate the pyramid volume that is most easily achieved by the entire students. The difference to students in mathematics also appeared on our analysis. Another impressive phenomenon is the quality of the math test still needs to be reviewed. Furthermore, there are also students who are not optimally answering math tests. This suggests the instructor to establish the quality of learning on math in the classroom.

1. Introduction

One point that can be achieved to improve the quality of education is through the global evaluation or assessment activities [1]. This affects the quality of education in an academic institution from primary education to higher education. Improvements to the quality of education are influenced by many factors, including students, school leaders, the environment, and the quality of learning [2].

The quality of education at a school will be created well if all factors of school at the school are functioning, and us carries assessments in education out [3]. To assess the improvement in the quality of education, I can do it through tests, measurements and assessments. One the teacher can do that is to do an assessment. Assessment in education comprises a variety of forms of assessment, but assessment is one form of effort that is done to identify students in what has been and is not yet known or not yet able to do [1]. Assessment is a systematic activity or process, carried out to collect, analyze and interpret information on the learning process and results of students in achieving learning goals and to take decisions with specific considerations [4, 5]. The learning activities in schools consist of two types of
assessment, especially formative assessment and summative assessment [1, 6, 7]. It uses formative assessment to develop and give feedback to students for the teaching and learning process that will be carried out. Formative assessment also presents information to students regarding teacher support, tutors and parents about learning goals [8], for illustration, analyzing students’ abilities through giving quizzes, short questions about what students need to recognize better about and the learning strategies that students require. While summative assessment is applied to test the performance that has been carried out in certain learning periods and is worked out at the top of the school age [7]. One assessment that is usually carried out by teachers is summative assessment, for illustration, in mathematics subjects or related to basic statistical skills.

Mathematics is one subject that have a significant part in promoting the strength to think sharply, reasonably, creatively and the ability to collaborate [9, 10]. Problems encountered by students in learning mathematics is an imbalance when students do not understand the math questions [11]. It cannot determine how to deal with a problem and cannot find out the results of the question given whether it is correct or incorrect [12]. Students at school often discover it challenging to work with the math learning process in class [13]. Such conditions are generated by many circumstances, one of which is associated to problem-solving abilities, students' cognitive style [14], mathematical communication [15, 16]. As the results from the study demonstrate that there is a significant positive relation between students' cognitive style of students problem-solving abilities. In addition, due to these various problems raises mathematic anxiety and stress [17-23] and statistical anxiety for students in school, then affecting student learning outcomes [24, 25].

Based on this, it is necessary to conduct an assessment to improve the quality of learning in schools, mathematics learning. Here, something can execute it using Rasch modeling analysis. Rasch modeling as an educational assessment [26] can measure the level of student ability, quality analysis of problems, difficulty of problems, detect misconceptions, bias in the question, the possibility of student's cheating and improve the way teachers teach [27]. The Rasch Model can support the teacher/lecturer to find out the quality of the learning done and the characteristics of the problem. So that improving the quality of education can be done easily, scientifically and precisely. Moving on from this condition we conduct an assessment related to the basic statistical and geometric abilities of students. The benefit of this study can be used by teachers to build the quality of mathematics learning the classroom.

2. Methods
The participant involved in this study as 159 students at Islamic Junior High School Darul Hikmah Bekasi. We evaluated the student’s ability on math based on basic statistics and geometry. The materials created became 40 items mathematics final exam and has been implemented on by students in May, 2018. The data were analysed using Rasch Measurement Tool (RMT) [28], which is focused on estimating quality test item, test information function, and quality person [1, 29]. The software WINSTEPS 4.01 Rasch Computer Programs was used to generated and examine data collection [30]. The research data set can be accessed in Open Science Framework.

3. Result and Discussion
3.1. Quality of Math Test
Our initial concentrate in this research, which is to examine the quality of the mathematics tests handed out to students. The data analysis proved that the quality of mathematical tests had extremely high reliability (α = .96). The quality of interaction between students with the applied test is also extremely valuable (α = .85). Unfortunately, the quality of the great test is not adhered to by a test ability to control students' mathematical abilities. Math test is not appropriate on target in testing students' mathematical abilities (71.2%), or in other words simply 28.8% of items can be classified. This indicates that in general the quality of the test still needs improvement. Visualization of the quality of mathematical tests is displayed in Figure 1.
Furthermore, based on the Outfit MNSQ = 1.25, we identified 7 questions (S17, S34, S10, S38, S8, S28, and S19) that exceeded the measurement threshold (outlier), which is a difficult class to predict students' mathematical abilities. Outlier questions are not good in making instrument tests so they are not considered in advanced data analysis. In this section, only 33 items have ideal measurement quality.

Figure 1. Raw variance in observations via principal component analysis

Based on Figure 2 & Figure 3 shows that item No. 7 is the most difficult item to answer by all students (+2.17 logit); on the contrary, item No. 21 is the easiest item to be answered by all students (-2.19 logit).

3.2. Students biases based on outlier-sensitive fit (Outfit) during the test

In addition to investigating the quality of math tests, we also explored the quality of answers to students who received math tests. This proposes to recognize which students have the proper response to the test applied. Students who have the appropriateness of the response are groups of students who achieve on the problem corresponding to their abilities, whereas students who have a disproportionate response are a group of students who experience problems with the applied mathematics test.

To measure students who have a response mismatch with mathematical tests is to point out to the OUTFIT MNSQ range (0.5 - 1.5 logit).
Table 1. Students Outlier (I=33, N=27 from 159)

| #Student | OUTFIT MNSQ | #Student | OUTFIT MNSQ | #Student | OUTFIT MNSQ |
|----------|------------|----------|------------|----------|------------|
| 125P     | 2.61       | 108P     | 1.68       | 154P     | .46        |
| 115P     | 2.34       | 080P     | 1.64       | 088P     | .49        |
| 042L     | 2.28       | 119P     | 1.64       | 141P     | .30        |
| 031L     | 2.03       | 151P     | 1.54       | 058L     | .45        |
| 014L     | 2.00       | 100P     | 1.52       | 091P     | .33        |
| 029L     | 1.90       | 105P     | 1.51       | 071P     | .26        |
| 155P     | 1.87       | 158P     | .43        | 079P     | .26        |
| 069P     | 1.79       | 153P     | .36        | 057L     | .48        |
| 033L     | 1.72       | 150P     | .34        | 103P     | 1.71       |

Measure in Logit. L=Laki-laki (Male), and P=Perempuan (Female)

Based on the data analysis, there were 27 outliers; consisting of 20 female and 7 male students. Twenty-seven students have OUTFIT MNSQ values outside the standard measurement range (0.5 - 1.5 logit). The results of this analysis also prove that particularly 132 students can be evaluated.

3.3. Student real performance on Math Test: Who the highest?

Figure 4. Variable Map of Students and their math test (I=33, N=132)
Relating to Figure 4 it is recognized that 102P students (+ 4.30 Logit) are students with the strongest mathematical abilities among all students who receive the test. In comparison, 039L students (-.93 Logit) were the students with the poorest mathematics abilities among all students who earned the test. The information contained in Figure 4 also indicates in general that all students have sufficient mathematical abilities (+1.30 > 0.00 Logit).

4. Conclusion
This research findings show that most students ability in mathematics is superb in answering basic statistical and geometry tests. Further research findings show that the average level of students' mathematical abilities in answering basic statistical and geometric tests is at a high level. While from 159 students only 27 students who exposed outlier. This study can be a reference for mathematics subject teachers at Junior High School Darul Hikmah Bekasi to prepare more compelling learning methods and strategies to encourage students to have good math skills.

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