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by Sitti Mania -

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Sitti Mania[1*], A. Sriyanti[1], Junari[1], Suharti[1], Baharuddin[1], Andi Halimah[1], Ainul Ulyuni Taufiq[1], Fitriani Nur[1], Andi Kusumayanti[1] and Andi Trisnowali MS[2]

[1]Universitas Islam Negeri Alauddin Makassar, Indonesia
[2]STKIP Muhammadiyah Bone, Indonesia

[*] sitti.mania@uin-alauddin.ac.id

Abstract. The study aims to produce diagnostic test instrument of two-tier multiple choices to identify the students understanding level of mathematic concept, to examine whether the developed test meets the criteria of good test quality based on its validity, reliability, difficulty level, item discrimination power, and choice effectiveness, and to explain the students' concept understanding level identified through the diagnostic test developed. The study used Research and Development as the research method with the Tessmer model which consists of 3 stages, namely: preliminary, self evaluation, and prototyping. The findings showed that there were 47.04% students that were categorized as understanding the concept, there were 12.22% students that got misconception, and there were 40.74% students that did not understand the concept. Based on the whole students' mean score, it can be concluded that the students had fair understanding on the concept of the material tested. Based on the understanding indicator of the concept tested, many students did not understand on how to change a representation form to other forms.

1. Introduction

The issue of education is an interesting topic to discuss about because every human needs education to develop the basic potential he / she has. Education is a conscious and well-planned effort to create learning atmosphere and process so that the learners actively develop their potential in order to have religious spiritual power, self-knowledge, personality, intelligence, noble character, and the skills needed by themselves, society, and country. Furthermore,[1] states that education as conscious effort is made to prepare learners through guidance, teaching, and/or training for their roles in the future.

Education functions to develop ability and create character and dignified nation civilization in order to educate the nation life, which aims to the development of the learners' potential to become a human being who believes and cautious to the Almighty God, has noble character, and become creative and responsible. In order to realize those goals, various efforts and improvements have been made. One of them is by eliminating the implementation of Education Unit Level Curriculum (KTSP) and changing it with Curriculum 2013 (K13). According to [2] this change is a mandate of teaching methodology changes and curriculum arrangement in the National Medium Term Development Plan (RPJMN).

Mathematics is a lesson training students to develop and improve logical, critical, and creative thinking [3] According to[4], mathematics learning in the Curriculum 2013 emphasizes on the modern

pedagogic dimension namely using scientific approach which includes observing, asking, reasoning, trying, and forming network for all lessons.

Conceptual understanding is one of the abilities that must be achieved by the students in learning mathematics. In [5] and [6], she explains that conceptual understanding is the students' ability in the form of mastery a number of subject matters, in which the students not only know or remember a number of concepts learned, but also they are able to retransform it into other form that are easy to understand, give data interpretation, and able to apply the concept appropriate with their cognitive structure.

As a matter of fact, many students still have problems in learning mathematics at school. According to [7], the problem that often occurs is the students' misconception on the material being taught. Misconception is students' inconsistent understanding with the expert understanding who has formulated the scientific concept of a material. The misconception is formed due to various things, such as the environment, the books used during the study, and the teachers' teaching method in explaining the material. Considering that one of the characteristics of mathematics is based on the previous knowledge or experience and numerical abilities that influence mathematics learning outcomes [8]. There will be a serious problem on the structure of the students' mathematical understanding where there is misconception or even they do not understand the concepts. Therefore, the evaluation activity should be conducted in order to find out the causes of students' lack of understanding or misconception and it is required a test that is appropriate with the goals.

One of the test forms that can be used to evaluate and determine the causes of the students' lack of understanding or misconception of a concept in mathematics lesson is diagnostic test. According to [9], diagnostic test is a test used to assess students' conceptual understanding, especially the weaknesses (misconception) of a certain topic and get feedback on students' responses to correct the weaknesses. Diagnostic test as described by [10] has two main functions, namely to identify problems or difficulties experienced by the students and to plan follow-up in the form of solution efforts in accordance with the identified problems or difficulties.

Diagnostic test that can be developed to identify the students' conceptual understanding is diagnostic test of two-tier multiple choices[11] adds that there are two parts in TTMC. The first part contains questions consisting of various answers, and the second part contains the reasons that refer to the answers listed in the first part. It makes the instrument becomes more effective in providing knowledge as the underlying reasons for the students' answers.

There are some previous researchers associated with this study, such as [12], [13], [14], and [15] who had conducted similar research and proved that diagnostic test of two-tier multiple choices could be used to identify students' conceptual understanding.

2. Method

This study is a Research and Development (R & D) by using Tessmer development model known as formative evaluation type. Tessmer development consists of 4 stages, namely: preliminary, self evaluation, prototyping stage (expert reviews, one-to-one and small group) and field test.

The try-out subject used in this study was the students of class X MIA 6 of MAN 1 Makassar in the odd semester of the academic year 2016/2017. The data collecting techniques consisted of test and questionnaire. The data analysis techniques consisted of instrument validation of two-tier multiple choices diagnostic tests, questionnaire analysis of the students' responses, reliability test, difficulty level analysis, item discrimination power analysis, choice effectiveness analysis, and the analysis of the students' mathematical conceptual understanding.

3. Findings and Discussion

3.1 Findings

3.1.1 Instrument validation of the two-tier multiple choices diagnostic test

Validators were required to provide the assessment on all test instruments that had been developed in prototype 1 consisting of contents, constructs, question language, and time allocation of the test and

the instruction containing in the instruments. The results were then analyzed by using methods of Content Validity Ratio (CVR) and Content Validity Index (CVI). The results from validity analysis are as follows.

Table 1. Validity Results of CVR and CVI

Test Item	Expert 1	Expert 2	Expert 3	CVR	Explanation
1	Yes	Yes	Yes	1	The item supported the content validity of the test
2	Yes	Yes	Yes	1	The item supported the content validity of the test
3	Yes	Yes	Yes	1	The item supported the content validity of the test
4	Yes	Yes	Yes	1	The item supported the content validity of the test
5	Yes	Yes	Yes	1	The item supported the content validity of the test
6	Yes	Yes	Yes	1	The item supported the content validity of the test
7	Yes	Yes	Yes	1	The item supported the content validity of the test
8	Yes	Yes	Yes	1	The item supported the content validity of the test
9	Yes	Yes	Yes	1	The item supported the content validity of the test
Total CVR				9	
CVI				1	

Based on table 1, it shows that from 9 test items, they have CVR and CVI result of 1. So CVR value > 0.99 and based on CVI criteria from 9 test items were categorized as very appropriate.

3.1.2 Students' questionnaire analysis
Based on the analysis results of the students' answers of the questionnaire in one-to-one try-out, it was found that the average students' positive responses were 79,17% and the average students' negative responses were 20,83%. While in the small group try-out, the average students' positive responses were 75% and the average students' negative responses were 25%.

3.1.3 The Instrument reliability test of the two-tier multiple choices diagnostic test
Based on the results of reliability test by using SPSS program version 20, it was found that the value of the instrument reliability test of the two-tier multiple choices diagnostic test was 0,737 with high interpretation. It shows that the instrument is reliable.

3.1.4 The instrument difficulty level of the two-tier multiple choices diagnostic test

Table 2. The Analysis of the Instrument Difficulty Level of the Two-Tier Multiple Choices Diagnostic Test

No	Category	Test Item	Total	Percentage
1.	Very Difficult	0	0	0
2.	Difficult	6, 7	2	22.22 %

No	Category	Test Item	Total	Percentage
3.	Medium	3, 4, 5, 8, 9	5	55.56%
4.	Easy	1, 2	2	22.22 %
5.	Very Easy	0	0	0

The results of the difficulty level analysis of the test item showed that 2 items were categorized as "difficult", 5 items were categorized as "medium", and 2 items were categorized as "easy". The average of the difficulty level obtained was 0.47 with category "medium", it means that the instrument difficulty level of the two-tier multiple choices diagnostic test was quite good overall.

3.1.5 The Instrument item discrimination power of the two-tier multiple choices diagnostic test

Table 3. The Instrument Item Discrimination Power of the Two-Tier Multiple Choices Diagnostic Test

No	Category	Test Item	Total	Percentage
1.	Very Poor	0	0	0 %
2.	Poor	0	0	0 %
3.	Fair	1, 4, 6, 7	4	44.44 %
4.	Good	2	1	11.11 %
5.	Very Good	3, 5, 8, 9	4	44.44 %

The result of the item discrimination power showed that 4 test items had discrimination powers which were categorized as "fair", 1 test item had discrimination power which was categorized as "good", and 4 test items had discrimination powers which were categorized as "very good". The average of the item discrimination power on the two-tier multiple choices diagnostic test was 0.61 with category "good", it means that the two-tier multiple choices diagnostic test was able to discriminate the high and low ability test takers

3.1.6 Choice effectiveness analysis of the two-tier multiple choices diagnostic test

Table 4. Choice Effectiveness Analysis Result of Two-Tier Multiple Choices Diagnostic Test

No	Category	Test Item	Total	Percentage
1.	Very Poor	1, 2	2	22.22%
2.	Poor	8	1	11.11%
3.	Fairly Good	3, 7, 9	3	33.33%
4.	Good	5	1	11.11%
5.	Very Good	4, 6	2	22.22%

The analysis result of the choice effectiveness of the two-tier multiple choices diagnostic test showed that 2 test items had 'very poor' choice effectiveness, 1 test item had 'poor' choice effectiveness, 3 test items had 'fairly good' choice effectiveness, and 1 test item had 'good' choice effectiveness, and 2 test items had 'very good' choice effectiveness. Overall, it could be concluded that the destructor of the test items were effective in destructing the test takers' answers because the test takers of low-skilled students group selected wrong answer due to being destructed with right answer.

3.1.7 Data analysis result of the students' mathematical conceptual understanding
The analysis results of the students' mathematical conceptual understanding level are as follows:

Table 5. Conceptual Understanding Percentage, Misconception, and Non-Conceptual Understanding Based on the Test Item Number

| Test Number | Criteria | | | | | |
| | Understand | | Misconception | | Not Understand | |
	F	%	F	%	F	%
1	24	80	6	20	0	0
2	25	83	5	17	0	0
3	17	57	4	13	9	30
4	10	33	2	7	18	60
5	15	50	2	7	13	43
6	3	10	5	17	22	73
7	2	7	3	10	25	83
8	11	37	3	10	16	53
9	20	67	3	10	7	23
Total	127	423	33	110	110	367
Mean Score	14.11	47.04	3.67	12.22	12.22	40.74

The table above showed that the percentage of the students who understood the concept from this study findings was 47.04%, the percentage of the students who got misconception was 12.22%, and the percentage of the students who did not understand the concept was 40.74%. Based on the table above, it could be seen that the percentages of the students who understood the concept, got misconception, and did not understand the concept were quite diverse.

3.2 Discussion

The result analysis of the two-tier multiple choices diagnostic test instrument showed that the percentage of the students who were categorized as having conceptual understanding of the whole subject matter was 47.04%, the percentage of the students who got misconception was 12.22%, and the percentage of the students who did not understand the concept was 40.74%. Then the mean score of all scores of the students' conceptual understanding was 47.04. Based on the criteria determination reference table of the students' conceptual understanding level, the $41 \leq value \leq 60.99$ was the interval score with conceptual understanding qualification in category 'fair'.

The analysis result of the students' conceptual understanding showed that the most misconception percentage was the test item number 1 with misconception percentage as many as 20% or as many as 6 from 30 test takers who got misconception on the test items. Based on the answer analysis, it was found that the students were still wrong in calculating the score of the absolute sign. Yet other 80% of the students had understood the concept on the subject matter being tested on the test. The subject matter which had high misconception was the equality and inequality of linier absolute value of one variable. While the most test items that the students could not understand were the test items number 6 and number 7 with the percentages of each 73% and 83%. The students tended to get difficulty in changing the known concepts in the test items into the mathematical forms. Therefore, to obtain the answers, they got difficulties and tended to leave their answers blank.

4. Conclusion

Overall, the calculation of the students' mean score in one class was known that the students' conceptual understanding was in 'fair' category with mean score of 47.04. Then it could be seen from the subject matter indicator and the students' conceptual understanding indicator that it was higher in the sub-subject matter of rational and irrational inequality of one variable compared with sub-subject matter of linier equality and inequality of one variable containing absolute value, while the misconception was slightly more common in the sub-subject matter of linier equality and inequality of one variable containing absolute value. The percentage of non-conceptual understanding was higher in

and irrational inequality of one variable. Then the conceptual understanding that the students could not achieve from the indicator most commonly from the assessed indicator was changing a representation form into other forms.

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