

Validity and Reliability Instrument for a Scientific-based Module Book

Ahmad

University of Muhammadiyah Purwokerto

ahmadump@yahoo.co.id

Abstract. The objective of this present research was to test the validity and reliability of a scientific-based module book according to the 2013 curriculum. This research was conducted in State Junior High School 2 (SMPN 2) Banyumas using descriptive quantitative approach. Two instruments were employed to test the validity and reliability of the module book. The results showed that the mean value obtained from the three experts in terms of the aspects of content, language and evaluation is 2.25, 3.44 and 3.58, respectively, and the overall mean value is 3.46. Based on the determined criterion, instrument validity should be higher than 3.00. Therefore, the module book has fulfilled the validity criterion. Meanwhile, based on the Grinnell's reliability instrument, a module book is considered to be reliable if the reliability value (R) is higher than 0.75. The reliability value of this book (R) is 0.75, so it has fulfilled the reliability requirement.

Keywords: *validity, reliability, module book, scientific approach.*

INTRODUCTION

Education is one of the pillars that enable a state to reach development in the field and science and technology. Moreover, it is a long-term investment that needs much money. If the field of education is mishandled and becomes a political commodity of the ruling party, it will cause a great disaster since it will give high and direct impacts on human beings. However, if this field is well developed and well managed, it will give a considerable contribution to the state and nation in the future.

Viewed from the aspects of needs and expectations in the field of mathematics, [1] state that mathematics education should fulfill two things, namely the present and the future. For the present, mathematics learning should lead to the understanding of concepts needed for solving mathematical problems and other related sciences. For the future, mathematics learning should provide a systematic basis for open, critical, proper, and objective thoughts [2].

The present problem is the existence of demand for greater "mathematics understanding" besides "language understanding. "Mathematics understanding" means one's ability to do mathematical operations in particular sub-domain, and to use the knowledge or idea to solve various contexts of problems, instead of routine ones. In this case, Indonesia is left behind from many other countries. Indonesia was ranked ranking 39th out of 41 countries in 2002 in PISA [3].

Although various activities and designs have been intended to change a learning pattern into the one involving more students to be active in the learning process, it seems that the design has not been successful. As stated in the research results of the National Institute for Educational Research (NIER), teachers' competences in mastering contents or skills to manage learning activities are still low [4]. Students' learning achievements, either at the national or international levels, as shown in the TIMMS, PISA, and EBANAS (National Education) are also still low [4]-[6]. Moreover, the learning pattern is dominated by the conveyance of information in a one-way fashion namely from the teachers to the students, and also by a similar and unchanged way, namely the mere emphasis on memorization [7].

There are many factors that cause the learning achievement of mathematics unsatisfactory, and one of them is that the teachers improperly use the textbooks in the classroom. Naturally, most teachers use the textbooks conventionally, or in a teacher-centered way. This learning pattern should be changed by encouraging students to be actively participated in the learning process. That is, teachers act as facilitators, and students understand mathematical concepts without any dependence on teachers.

To implement the learning activities of mathematics above, teachers should be familiar with various approaches and may implement them to arouse good attitude, and improve students' understanding and thinking skills by applying technology and other useful teaching aids. Due to the implementation of various module books of mathematics, students have better opportunities to be actively involved in the learning process. This present module book was applied to change the teacher-centered learning activities into the student-centered one. The student-centered learning scenario will be successful if teachers may make use of more various flexible teaching strategies. Although the teaching materials of mathematics applied are appropriate and steady, they cannot guarantee the attainment of the educational goal since one of the crucial factors is the learning process [8]. Then [9] stated that an effective learning process translating learning principles must gain some success if the principles are really obeyed by the students. The choice of learning strategies is crucial since the chosen strategy is related to the determination of appropriate teaching principles.

Based on the phenomenon above, a question on how the module book may involve students' activities optimally and be in line with the insights of mathematics

education arises. One of the module books that may help students train to solve mathematical problems is using problem-based module book. This module book adopts an approach to students' learning in real problems, so that the students may construct their own knowledge, develop high competency, and make them independent and improve their self-confidence [10]-[12].

METHOD

This is descriptive qualitative research conducted in State Junior High School 2 (SMPN 2), Sokaraja, Banyumas regency, with the subject of grade 8 module book to test its validity and reliability. The validity and reliability testing was made by three experts consisting of two persons from University of Muhammadiyah Purwokerto and one person from University of Muhammadiyah Malang.

RESULTS

The instrument of this module book was rated by three experts who were lecturers of Mathematics Education at University of Muhammadiyah Purwokerto and University of Muhammadiyah Malang.

Table 1: Results of the Evaluation of the Validity Instrument of the Module book

No.	Evaluation Aspects	K _i	A _i
1	Content		
	(i) The Implementation Guide is well stated	3.25	
	(ii) The evaluation criteria are clearly stated	3.17	
	(iii) The statements in the instrument clearly evaluate the theoretical foundation	3.42	
	(iv) The statements in the instrument clearly evaluate the module book components (syntax, social system, teacher's activity, supporting system, impact, and implementation)	3.50	3.35
	(v) There is appropriateness between the contents of the statements of the module book	3.50	
	(vi) Statements in the instruments cover the whole aspects of the evaluation	3.25	
2	Language		
	(vii) Statements in the instrument of the module book do not have ambiguous meanings	3.33	
	(viii) Statements in the instrument are not overlapping	3.58	3.44
	(ix) Statements in the instruments are easy to understand	3.42	

Total Mean (MK)	3.58	3.58	3.46
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K_i = Mean of each evaluation element, A_i = Mean of each evaluation aspect

The aspects rated were content, language, and evaluation. The aspects of the content include 1) implementation and evaluation guide; 2) theoretical foundation; 3) module book components; 4) appropriateness of the statements and the contents, and 5) aspects of the module book. The aspects of the language cover: 1) no overlapping and ambiguous meanings and 2) easy to understand. Then the aspect of the comprehensive evaluation is the implementation of the instrument. The results of the experts' evaluation are presented in Table 1 below.

Table 1 shows that the mean value of the three raters is 3.35 for the content aspect dealing with the statement that the instrument assesses the module book components clearly. In the language aspect, the mean value was 3.44, meaning that the instrument did not contain overlapping and ambiguous meanings. As a whole, the overall mean value of the evaluation aspect of three raters was 2.58, showing that the implementation of the instrument was apparent.

The mean values from the three experts dealing with the content, language, and evaluation were 3.35, 3.44, and 3.58, respectively, while the overall mean was 3.46. On

the basis of the criteria determined in the instrument validity, which is higher than 3.00, the instrument of the module book fulfilled the validity requirement.

When the instrument fulfilled the validity requirement, the evaluation of the instrument reliability was made. The evaluation of the instrument reliability was made twice in different times with the time interval of 2 weeks, and the results of the evaluation of the instrument reliability of the module book are presented in Table 2 below.

Table 2: Results of Evaluation of the Instrument Reliability of the Module book.

Aspect No. Item	P1	P2	Result of Evaluation						Amount	
			P3		A		D		A	D
			A	D	A	D	A	D	A	D
Theoretical Foundation										
1			1	0	1	0	1	0	3	0
2			0	1	1	1	1	0	2	2
Syntax of the Module book										
3			1	0	1	0	1	0	3	0
4			1	1	1	0	1	0	3	1
5			0	0	1	0	1	1	2	1
6			1	1	1	0	1	0	3	1
Social System										
7			1	0	1	0	1	1	3	1
8			0	1	1	0	1	0	2	1
Teachers' Activities										
9			1	0	1	0	1	0	3	0
10			1	0	1	0	1	1	3	1
11			1	1	1	0	1	0	3	1
Supporting System										
12			0	0	0	1	1	0	1	1
13			1	1	1	0	1	0	3	1
14			1	1	1	0	1	1	3	2
15			1	1	1	0	1	0	3	1
Impact										
16			1	0	0	1	1	0	2	1
17			1	0	1	0	0	1	2	1
18			1	0	1	0	1	0	3	0
19			0	1	1	0	1	0	2	1
Implementation										
20	1	0	1	0	1	0	1	0	3	0
21			1	0	1	1	1	0	3	
22			1	0	1	0	1	1	3	
23			1	0	1	0	1	0	3	
24			1	1	1	0	1	0	3	
Total									67	22
	25		1	1	1	1	1	0	2	

A=agreement (the same answer between the first and second raters)

D=disagreement (different answer between the first and second raters)

AH=Rater

Table 2 shows the disagreement of the evaluation of the module book instrument. The agreement occurred when there were similarities in the answers between the first and the second raters, while disagreements suggested different answers between the raters. The scores of the agreement and disagreement were 67 and 22, respectively. Based on the Grinnell's coefficient reliability, the value of the

obtained reliability was $R=67/(67+22)=0.753$. The value of $R>0.75$ shows that the instrument of the module book fulfilled the reliability requirement.

CONCLUSION

The mean value of the three raters is 3.35 for the content aspect dealing with the statement that the instrument assesses the module book components clearly. From the language aspect, the mean obtained is 3.44, meaning that the instrument does not have contents which are overlapping or have ambiguous meanings. As a whole, the mean value of the evaluation aspect of the three raters is 3.58, meaning that the implementation of the instrument is very clear.

The mean value of the three raters in assessing the content, language, and evaluation aspects are 3.35, 3.44, and 3.58, respectively, while the overall mean value is 3.46. On the basis of the criteria of the instrument validity, which is higher than 3.000, so the module book instruments were found to have fulfilled the validity requirement.

Based on the Grinell's reliability coefficient, the value of the reliability is .0753 (higher than 0.75), which means that the instrument of the module book fulfills the reliability requirement.

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