

Evaluation of Validity and Reliability for Scientific-Based Module

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Abstract

This study aims to test the validity and reliability of scientific-based modules in accordance with the 2013 curriculum. This study uses a descriptive-quantitative approach. The subjects of this study were students of SMP Negeri 2, Sokaraja, Banyumas. Research instruments include instruments to test validity and instruments to test module reliability. The module is assessed by three experts in aspects of content, language and evaluation. The results showed that the average value in terms of the content aspect was 2.25, in the language aspect it was 3.44, and in the evaluation aspect it was 3.58. While the overall average value is 3.46. Therefore, the module meets the validity and reliability criteria. Modules can be used by teachers in learning in schools that use the 2013 curriculum.

Keywords: module, reliability, validity

I. 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 a lot of 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. But, if this field is well-developed and –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, in [1] state that the mathematics education basically should fulfil 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 [3].

The present problem is the existence of demand for greater “mathematics understanding” besides “language understanding. “Mathematics understanding” means one’s ability in doing mathematical operations in certain sub-domain, and in using the knowledge or idea to solve various contexts of problems, instead of routine ones. in this case, Indonesia is left behind from a lot of countries. Indonesia is at the ranking of 39 of 41 countries joining in PISA in 2002 [10].

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, but it seems that the design has not been well 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 [8]. Students’ learning achievements either at the national or international levels, as shown in the TIMMS, PISA and EBANAS (National Education) are also still low [2, 4, 8]. 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 emphasis on merely the aspect of memorization [9].

There are a lot of factor that cause the learning achievement of mathematics not to be satisfactory, and one of them is that the teachers improperly use the module books in the classroom. Naturally, most teachers use the module books conventionally, namely in a teacher-centred way. This learning pattern should be changed by encouraging students to gain sciences. Teachers act as facilitators and students themselves that should understand mathematical concepts without any dependence on teachers.

To implement the learning activities of mathematics above, teachers should be well familiar with and may implement various approaches to learning that may arouse attitude, improve students' understanding and thinking skills deeply by applying technology and other 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-centred learning activities into the student-centred one. The student-centred 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 important factors is the learning process which gives a priority over the students optimally [5]. Then, in [7] stated that 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 very important since the chosen strategy is related to the determination of appropriate teaching principles.

On the basis of 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 problem using the problem-based module book. This module book adopts an approach to students' learning in the real problems, so that the students may construct their own knowledge, develop high competency and make them independent and improve their self-confidence [11-13].

2. Methodology

It is a qualitative approach with the descriptive type. The research was conducted in State Junior High School 2 (SMPN 2), Sokaraja, Banyumas regency with the subject of grade 8 to test the instrument 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 of University of Muhammadiyah Malang.

3. Results and Discussion

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

The aspects rated are content, language, and evaluation. The aspects of the content include: 1) implementation and evaluation guide; 2) theoretical foundation; 3) module book component; 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 general evaluation is the implementation of the instrument. The results of the experts' evaluation are presented in Table 1.

From Table 1, it is known 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 is 3.44, meaning that the instrument does not contain overlapping and ambiguous meanings. As a whole, the overall mean value of the evaluation aspect of three raters is 2.58, showing that the implementation of the instrument is very clear.

The mean values from the three experts dealing with the content, language, and evaluation were 3.35, 3.44, and 3.58, respectively, meanwhile the overall mean is 3.46. On the basis of the criteria determined in the instrument validity, it is higher than 3.00, so that the instrument of the module book fulfilled the validity requirement.

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

No.	Evaluation Aspect	K _i	A _i
1	Content		
	(i) The Implementation Guide is well stated	3.25	3.35
	(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	
	(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	3.44
	(viii) Statements in the instrument are not overlapping	3.58	
	(ix) Statements in the instruments use a language easy to understand	3.42	
3	Evaluation	3.58	3.58
	The Total Mean (MK)		3.46

K_i = Mean of each evaluation element, A_i = Mean of each evaluation aspect

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.

Table 2 shows the disagreement of evaluation of evaluation of the module book instrument. The disagreement applies if there is the similarity in answer between the first and the second raters, while if difference occurs it may be considered to be disagreement between the raters. The scores of the agreement and disagreement are 67 and 22, respectively. On the basis of the Grinnell's coefficient reliability, the value of the obtain reliability was $R=67/(67+22)=0.753$. The value of $R>0.75$ shows the instrument of the module book fulfils the reliability requirement.

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

Aspect	No. Item	Result of Evaluation						Amount	
		P1		P2		P3			
		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	3	0
	21	1	0	1	1	1	0	3	1
	22	1	0	1	0	1	1	3	1
	23	1	0	1	0	1	0	3	0
	24	1	1	1	0	1	0	3	1
	25	1	1	1	1	1	0	3	2
Total								67	22

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

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

AH=Rater

As in [14], this module can be further developed by instilling critical thinking skills.

4. Conclusion

The mean value of the three raters are 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 contain overlapping and 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 is 3.35, 3.44 and 3.58, respectively, while the overall mean value is 3.46. On the basis of the criteria determined dealing the instrument validity, it is higher than 3.000, so that the module book instruments have fulfilled the validity requirement.

Based on the Grinnell's reliability coefficient, the value of the reliability is .0753 and it is higher than 0.75. So, this shows that the instrument of the module book has fulfills reliability requirement.

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