Effectiveness of Physics Module Based on Contextual Learning Accompanied by Multiple Representations in Physics Learning on Senior High School

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ABSTRACT

The purpose of this research was to describe the effectiveness of Physics module based on contextual learning accompanied by multiple representations in Physics learning on senior high school. The effectiveness in this research was operationally defined as a measure of how much the level of students' success in achieving predetermined learning goals and it can be determined from the results of student tests. This type of research was quasi-experiment with the pre-test and post-test group design and this research carried out in SMA Nuris Jember with the number of respondents was 30 student. Based on the results of the research, it is known that Physics modules based on contextual learning accompanied by multiple representation was effectively used in Physics learning with the student's pre-test score of 22.3 and the student's post-test score of 76.67 so that the N-gain value was 0.71 in the high category.

Keyword: - *Effectiveness, Physics module, Contextual learning, Multiple representation*

1. INTRODUCTION

The curriculum that was implemented from the 2013/2014 school year was the 2013 curriculum by directing the student-centered learning process. In other words, in the learning process students are directed to learn independently. One of the teaching materials that can support the student's independent learning process is the module [1]. Modules are printed teaching materials consisting of material descriptions, exercises, and evaluations that are designed systematically with certain formats and packaged in the form of learning units according to a particular curriculum and can be used by students to learn and understand concepts independently [2,3].

Physics is a branch of natural science (IPA) which discusses about nature and its symptoms, from the real (visible in real) to abstract or even in the form of theories whose discussion involves the ability of imagination or the involvement of a strong mental picture [4]. Thus, in the learning process Physics is expected to occur a learning process with the aim of obtaining and processing knowledge about the events and symptoms of nature [5]. The results of the identification carried out by the Ministry of National Education on the objective conditions of learning Physics in schools showed problems including: 1) many students were able to memorize the material they had learned but they did not understand the concept of the material; 2) most students are not able to apply or utilize the knowledge they get; and 3) students have difficulty understanding abstract material using only the lecture method. [6]. In addition, Physics teaching materials have been linear in nature, only presenting concepts and principles, examples of problems and solutions, and practice questions [7]. Teaching materials are less associated with real problems that exist in everyday life.. Responding to these problems, we need contextual teaching materials, meaning that the teaching materials contain learning material that is related to real-world situations and conditions in the student environment so as to encourage students to apply them in daily life [8,9].

Natural phenomena in physics are formed by the interaction of various physical quantities. Functional relationships that occur between physical quantities in a natural phenomenon are usually formulated in verbal and

mathematical form and then visualized in the form of images and graphics [10]. With such characteristics, students are required to have the ability to master and manage changes among different representations simultaneously [11]. Multiple representation is one of the good and developing methods to instil understanding of physics concepts so that it can be used as an approach in developing Physics teaching materials. [12]. The form of various representations is predicted to be able to help students understand the concepts learned and the students' ability to understand the concepts become more evenly distributed because the presentation of concepts is not only emphasized in one representation but verbal, mathematical, image and graphic representation [10]. Multiple representation helps students think creatively by connecting various forms of representation with application in real life so that the representation presented in learning Physics must be contextual [11]. Thus, one alternative teaching material that can be developed is a Physics module based on contextual learning accompanied by multiple representations. Physics module based on contextual learning accompanied by multiple representations is an independent student teaching material that contains a series of learning activities that are based on real problems that exist in daily life and are presented in the form of verbal, mathematical, image, and graphic representations so that the material concepts that he gets can be meaningful and can be applied in everyday life.

Physics module based on contextual learning accompanied by multiple representations that had been developed contains of learning activities in accordance with the learning objectives that have been previously set. The success of a product development can be seen from the effectiveness of the product itself. With regard to education, the effectiveness relates to student's achievement of goals in teaching. As it is known that in the learning process at school, must have a target teaching materials that must be achieved by each teacher that is based on the curriculum prevailing at that time. Teaching materials which are mostly summarized in the curriculum certainly must according to the time available without ignoring the main purpose of learning itself, namely students' understanding and skills. So that learning can be said effective when the learning objectives can be achieved well [13]. Therefore, it is necessary to analyze the effectiveness of the modules that have been developed.

2. RESEARCH METHOD

This type of research is quasi-experiment with the pre-test and post-test group design. According to Arikunto, this research design can be developed into a pattern like Figure 1 below [14].

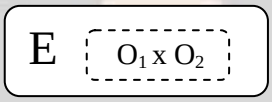

Fig -1. Pre-test and post-test group design

Information:

E : experiment class

O_1 : the value of the experimental class pre-test results before being treated

O_2 : the value of the experimental class post-test results after being treated

X : learning treatment using Physics module based on contextual learning accompanied by multiple representation

The research was conducted in class X IPA 2 SMA Nuris Jember with the number of respondents 30 students. To describe the effectiveness of Physics module based on contextual learning accompanied by multiple representations based on the tests given to students the formula is used:

$$N - gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

Information:

N-gain = gain value

S_{pre}= *pre- test score*

S_{post}= *post-test score*

S_{max}= maximum score

With the score acquisition category as follows.

Table -1 *N-gain* score acquisition category

Number	Range	Category
1	*N-gain* ≥ 0,7	High
2	0,3 ≤ *N-gain* < 0,7	Medium
3	*N-gain*<0.3	Low

3. RESULT AND DISCUSSION

The effectiveness analysis of Physics module based on contextual learning accompanied by multiple representations was carried out by analyzing the normality gain score (N-gain) of the students' pre-test and post-test scores. In detail, the results of the analysis of normality gain score (N-gain) in detail can be seen in Table 2 below.

Table -2 The value of N-gain analysis

Number	**Student's name**	***Pre-Test Score***	***Post-Test Score***	***N-Gain***	**Category**
1	AAR	37	98	0,97	High
2	ARH	35	87	0,80	High
3	AA	26	82	0,76	High
4	AM	31	85	0,78	High
5	AWS	18	78	0,73	High
6	DSS	33	100	1,00	High
7	DAP	15	70	0,65	Medium
8	EYS	26	75	0,66	Medium
9	EFS	5	44	0,41	Medium
10	FS	18	57	0,48	Medium
11	FAF	16	62	0,55	Medium
12	FAK	18	70	0,63	Medium
13	FIAN	33	89	0,84	High
14	GRJ	21	80	0,75	High
15	HM	6	45	0,41	Medium
16	HDJ	15	75	0,71	High
17	KLQ	15	75	0,71	High
18	LGM	16	75	0,70	High
19	MPA	19	70	0,63	Medium
20	NASW	33	87	0,81	High
21	NKN	26	88	0,84	High
22	NNM	21	77	0,71	High
23	NF	38	89	0,82	High
24	RSM	21	75	0,68	Medium
25	RDC	18	77	0,72	High
26	SAR	13	70	0,66	Medium
27	SSW	18	75	0,70	High
28	SADR	19	62	0,53	Medium
29	YR	35	98	0,97	High
30	YAF	24	85	0,80	High
Average		**22,3**	**76,67**	**0,71**	**High**

Based on the results of the N-gain analysis, the average pre-test score of students was 22.3 and the average post-test score of students was 76.67 so that the N-gain value was 0.71 in the high category. Thus, Physics module based on contextual learning accompanied by multiple representations is effectively used in learning Physics. This is supported by relevant research conducted by Azizah showing that module based on contextual learning accompanied by multiple representations can improve multiple representation abilities with high-category N-Gain scores and receive positive responses from students [15]. In addition, Soleha through the results of her research said that supplementary book based on multiple representation was effectively used as student teaching materials [16].

4. CONCLUSIONS

Based on result and discussion above, we can conclude that Physics module based on contextual learning accompanied by multiple representations was stated to be effective with N-gain score is 0.71 in high category.

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