Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/15693
DOI URL: http://dx.doi.org/10.21474/IJAR01/15693

RESEARCH ARTICLE

THE EFFECTIVENESS OF BRAIN BASED LEARNING TEXTBOOK ON CLIMATE CHANGE MATERIAL TO IMPROVE STUDENTS' CREATIVE THINKING SKILLS

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Manuscript Info

Manuscript History
Received: 15 September 2022
Final Accepted: 19 October 2022
Published: November 2022

Key words:-
Education, Textbook, Brain Based Learning, Creative Thinking

Abstract

The purpose of this research is to test the effectiveness of brain-based learning textbooks in improving students' creative thinking skills. Subjects on this study were seventh grade students (VII) of junior high school or madrasah tsanawiyah for the period 2022-2023. The methodology of this research is an experiment with a one group pretest and posttest design without a control class. Data collection techniques used tests in two different class. The technique to collect data is using tests. The techniqueof data analysis to determine the effectiveness by using the N-gain formula. Based on the data, the results of the analysis showed that the increase in learning outcomes for each class (VIID and VIIG) was 0.65 (medium category) and 0.66 (medium category). Thus, it can be concluded that brain-based learning textbooks can improve students' creative thinking skills.

Introduction:-

Education is one of the important elements in the development of a nation. The progress of a nation is determined by the quality of its human resources. Various efforts were made to bring a positive influence to the world of education. One of the goals of 21st century education is to be able to make children think creatively both in terms of solving or solving problems as well as the ability to communicate or convey their thoughts (Nur, 2016: 27). Creative thinking can be interpreted as the ability to solve a problem with more than one solution and students think fluently, flexible, elaborate, and have originality in their answers (Marliani, 2015: 15).

Based on the results of the latest PISA (Program for International Student Assessment) in 2018, for the science performance category, Indonesia is ranked 71 out of 79 countries (OECD, 2018). This shows that Indonesian students do not yet have the ability to think creatively. This is in accordance with the research conducted by Handayani et al. (2018) regarding the creative thinking ability of junior high school students as many as 25 students, and obtained as many as 22 students who are included in the less creative category and 1 student is not creative. Research also conducted by Arini and Asmila (2017) shows that the average percentage of students is less creative as much as 42.85%, students are not creative as much as 32.14%, creative students are 25%.

According to Rubiyanti and Suparman (2018), the presentation of teaching materials can be a stimulus and trigger to improve students' creative thinking skills. One form of teaching materials is textbooks. The development of a good textbook should be based on an interesting learning approach. An interesting and fun learning approach is believed to be able to involve the left and right brain functions so that in the learning process students are required to think creatively how to maximize the abilities of their left and right brain during the learning process (Nur, 2016).

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Learning according to these characteristics is brain based learning.

Brain-based learning is a concept to create learning that is oriented towards empowering the potential of the brain (Jensen, 2011). Brain based learning is learning that is able to provide space for students to think freely without pressure, a supportive learning environment, and full of stimuli that stimulate creative thinking.

Then from the results of the questionnaire on the needs of science teachers, 73.3% of textbooks used by teachers in learning have not been able to train students' creative thinking skills. Based on the student needs questionnaire, 100% of students have never used a brain-based learning textbook. Based on this, it can be said that one of the innovations made to make learning more meaningful is to develop a textbook based on brain-based learning.

Research Method:-

To collect the data in this reasearch is using written tests called pretest and posttest. The research design used was Pre-Experimental Design in the form of one group pretest-posttest design (Figure 1). One sample group of 22 students who were deliberately selected was then given a pre-test (O1), followed by treatment (X), and at the end of the lesson the sample was given a post-test (O2). This design is used to determine the effectiveness of science textbooks based on brain based learning on climate change material to increase the creative thinking skills of seventh grade students. In simple terms, the research design used can be described as follows:

$$O_1 \; X \; O_2$$

Figure 1:- Research design one group pretest and posttest.

Description:
O1 = Pre-test
O2 = Post-test
X = Learning treatment use textbook based on brain based learning

This research data consist of quantitative data obtained from essay test such as pretest and posttest. Then the value data of pretest and posttest calculates using in the following formula:

$$\text{N} - \text{gain} = \frac{\text{posttest score} - \text{prestest score}}{\text{maximum score} - \text{pretest score}}$$

The criteria for the gain score can be seen in Table 1, below:

Table 1:- The N-Gain score criteria.

No.	Value Range	Qualitative Criteria
1	$g \geq 0,7$	High
2	$0,3 \leq g < 0,7$	Medium
3	$g < 0,3$	Low

Brain-based learning textbooks are said to be effective if they can improve students' creative thinking skills. Students' creative thinking ability is measured using instruments in the form of pre-test and post-test which contains four indicators of creative thinking which include fluency, flexibility, originality, and elaboration. The measurable level of creative thinking is illustrated in table 2.

Table 2:- Indicators of Creative Thinking Skills.

Aspects of Creative Thinking	Score Level of Each Indicator			
	1	2	3	4
Fluency	Do not have ability to generate multiple ideas and responses	Less gives ideas or responses	Simply provide ideas or responses	Give lots of multiple ideas ordiverse responses
Flexibility	Do not have ability	Less able to produce	Enough to be able to	the ability to

	to generate a variety of ideas	various kinds of ideas/answers	generate various ideas/answers	produce a variety of ideas, varied answers, using a variety of approaches
Originality	Unable to produce many smart, unique and unusual ideas	Less able to produce a lot of smart, unique and unusual ideas	Sufficiently able to produce lots of smart, unique and unusual ideas	Generate lots of smart, unique and unusual/different ideas/ ideas from the ones in general
Elaboration	Unable to develop and assemble ideas in detail	Less able to develop and assemble ideas in detail	Enough to be able to develop and assemble ideas in detail	Expanding, developing and assembling ideas by detailing and making a change

Results and Discussion:-

The effectiveness of brain based learning bookcan be category effective in learning if understanding test result obtain N-Gain value with minimum average criteria. The average result of pretest, posttest and N-Gain in small class test can be seen in the table 3.

Table 3:- Result of Gain Score Analysis of Creative Thinking Skills in Class VII-D.

Test Result	Meeting	Criteria	Total students	N-Gain average	Percentage
Creative thinking result	I	High	2	0,74	22,2%
		Medium	7	0,63	77,8%
		Low	-	-	-
	II	High	2	0,74	22,2%
		Medium	7	0,54	77,8%
		Low	-	-	-
	III	High	3	0,73	33,3%
		Medium	6	0,55	66,7%
		Low	-	-	-
Average N-Gain Overall				0,65	

The results of the gain score analysis for the creative thinking ability test at the first meeting showed the results as much as 22.2% of students obtained an average gain score of 0.74 which means that it is high or effective criteria. In addition, as many as 77.8% of students obtained an average gain score of 0.63 which means that it is categorized as moderate or quite effective. For the second meeting, the results showed that 22.2% of students obtained an average gain score of 0.74, which means that it is in the high or effective criteria. In addition, as many as 77.8% of students obtained an average gain score of 0.54 which means that it is categorized as moderate or quite effective. Then at the third meeting, 33.3% of students obtained an average gain score of 0.73 which means that they enter the high or effective criteria. In addition, as many as 66.7% of students obtained an average gain score of 0.55, which means that it is categorized as moderate or quite effective. Overall from the two meetings the average gain score obtained was 0.65, which means that it is moderate or quite effective. This shows that science textbooks based on brain-based learning on climate change materials are effective in improving students' creative thinking skills.

Table 4:- Results of Gain Score Analysis of Creative Thinking Ability in Class VII-G.

Test Result	Meeting	Criteria	Total students	N-Gain average	Percentage
Creative thinking result	I	High	5	0,76	20%
		Medium	20	0,58	80%
		Low	-	-	-
	II	High	6	0,72	24%
		Medium	19	0,58	76%
		Low	-	-	-
	III	High	5	0,77	20%

		Medium	20	0,56	80%
		Low	-	-	-
Average N-Gain Overall				0,66	

The results of the gain score analysis for the creative thinking ability test at the first meeting showed that as many as 20% of students obtained an average gain score of 0.76, which means that it is high or effective criteria. In addition, as many as 80% of students obtained an average gain score of 0.58, which means that it is categorized as moderate or quite effective. For the second meeting, the results showed that 24% of students obtained an average gain score of 0.72, which means that they enter the high or effective criteria. In addition, as many as 76% of students obtained an average gain score of 0.58, which means that it is categorized as moderate or quite effective. For the third meeting, the results showed that 20% of students obtained an average gain score of 0.77, which means that they enter the high or effective criteria. In addition, as many as 80% of students obtained an average gain score of 0.56, which means that it is categorized as moderate or quite effective. Overall, from the two meetings the average gain score obtained was 0.66, which means that it is in the moderate category or quite effective. This shows that science textbooks based on brain-based learning climate change materials are quite effective in improving students' creative thinking skills.

Based on the results in the two different classes, the results are not much different, namely the students' creative thinking ability is in the medium category. It can be interpreted that science textbooks based on brain based learning on climate change material are effective or good for improving students' creative thinking skills. This is in accordance with Imanuel et al (2021) which states that learning using brain based learning can improve students' creative thinking skills and self-efficacy. Based on research conducted by Nurlaila (2015) also showed that the brain-based learning strategy succeeded in increasing students' critical thinking and creative thinking abilities in learning mathematics in junior high schools.

According to Alexander in Wulandari (2019), explaining that an individual's success is determined by his creative ability in solving problems, both large and small scale. This shows that the ability to think creatively is very important for students and must be maximized in the learning process. Creative thinking skills can be trained through learning with a brain based learning approach that can be integrated through content or media based on brain based learning. This proves that the development of brain-based learning science textbooks is indeed appropriate and effective to improve students' creative thinking skills.

Conclusion:-

Based on the results of the research on the effectiveness of textbooks based on brain based learning of this climate change material, it is indeed proven to be effective enough in improving the creative thinking skills of junior high school or madrasah tsanawiyah students.

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