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Problem-Based Learning and Quick Response Code Development of Democracy

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Abstract

Democracy learning has not had the main teaching materials that support it since 2011. For this reason, this research is urgent. With the aim that there are teaching materials for democracy that are up to date based on the results of research by paying attention to the character of Generation Z. This study uses the method of Research and Development with a Step of System Approach Model of Educational Research and Development Dick and Carey's with ten stages. Democracy-based teaching materials Problem-Based Learning and Quick Response Code were declared feasible by experts, both material experts, language experts, and design experts, with an average score of 4.84. Data from 40 students after being tested for normality and declared normal, then a t-test was carried out, this teaching material was effective at a level of 0.05, with a $t_{value_{count}} (29,406) > t_{table} (2.023)$. With a difference in the average pre-test and post-test of 26.43. Thus this democratic teaching material contributes to improving democratic learning outcomes and is effective. Furthermore, the teaching materials were submitted for Intellectual Property Rights, and published by PT Raja Grafindo Persada.

Keywords: Learning, Democracy, Problem-Based Learning, QR Code

Introduction

Good democratic learning, equipped with teaching materials *up to date*. Teaching materials should be made based on research results. By paying attention to the characteristics of students and models *Problem-Based Learning*. So learning about democracy is more meaningful, not only theoretical but equipped with daily practice and being able to solve problems. With the hope that learning outcomes can be improved.

However, in reality, learning civics courses in which there is material on democracy, since 2011 there has been no up-to-date book. Lecturers teach with existing resources, supplemented by material from the internet. Creative educators, look for other sources. Studying democracy material is limited to the theoretical aspect only. For this reason, it is very urgent to conduct research related to democracy teaching materials. By paying attention to the characteristics of students who are Generation Z. by using the model *Problem-Based Learning* (Heaviside, et. al., 2018).

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Students will be skilled at solving problems related to democracy in everyday life. *PBL is a student-centered learning model based on the constructivist approach in education* (Hendry, Frommer, & Walker, 1999; Savery, 2015). In PBL, the student can work both individually and cooperatively within an inquiry process to solve complex and ill-structured problems from real live contexts (Barrows & Tamblyn, 1980).

Students who fall into the Z generation category have relatively lower physical communication skills, and higher use of technology in almost all fields (Glass, 2007; Mac Kenzie et.al., 2014; Weidmer, 2015). This goes hand in hand with the usage *Quick Response Code* democracy book. *Quick Response Code* was developed as a code classification that allows high-speed reading with a scanner (Edinger, et.al., 2018).

As for the formulation of the problem:

1. How to develop democracy-based teaching materials *Problem-Based Learning* and quick *Response Code*?
2. How is the feasibility of democracy-based teaching materials *Problem-Based Learning* and Quick *Response Codes*?
3. How is the effectiveness of democracy-based teaching materials *Problem Based Learning* and quick *Response Code*?

Literature Review

Teaching Materials

Teaching materials are called learning *material*, in addition to instructional material which includes visual aids such as handouts, and *slide overread*, which consists of text, diagrams, images, photos, audio, and video animation (Butcher et.al., 2019). Teaching materials are known as teaching *material* which is seen as material provided for learning needs which include textbooks, videos, and audio (Bal-Gezegin, 2014).

Thus teaching materials are materials for learning, which are arranged systematically, based on the applicable curriculum to develop cognitive, affective, and psychomotor aspects. Teaching materials can help students and educators, in carrying out the learning process. Democracy-based teaching materials *Problem-Based Learning* and *Quick Response Codes*, will result from this research. Teaching materials as a research product, follow the rules of writing and content according to the curriculum.

Democracy

The definition of democracy according to C.F Strong is a system of government, where the majority of adult members of the political community participate on the basis of a system of representation, which ensures that the government is ultimately accountable for the actions of the majority (<https://www.hukumonline.com>).

Sidney Hook defines democracy as a form of government, in which important government decisions, either directly or indirectly, are based on the majority agreement freely given by the adult population (<https://www.hukumonline.com>).

Based on some of the opinions above, we conclude that the notion of democracy is a system of government in which all the people are entitled, must participate actively, either directly or indirectly, to reach an agreement, and ensure that the government must be accountable for all its actions to the community. The purpose of democracy is to create a prosperous, just and prosperous society.

With the concept of promoting fairness, honesty, and openness. In concept, the goals of democracy in the life of the state also include freedom of expression and people's sovereignty. <https://www.google.com/search?client=firefox-b-d:&q=demokrasi>) 23 July 2020.

A country can be said to be running a democratic process if it fulfills the following characteristics: (<https://nasional.kompas.com/read/2022/03/17/03000041/ciri-ciri-demokrasi>)

- a) Government decisions for all people
- b) constitutional feature
- c) Representative features
- d) Characteristics of general elections
- is) Party characteristics
- f) Responsibility feature

One feature is the existence of general elections. Regarding general elections, in any country in the world there are always problems. The problems that arise are real, not contrived. For this reason, teaching materials for democracy will be prepared both in theory and in practice. In this "practice" based learning will be used *Problem Based Learning*.

The practice of democracy in everyday life needs to be done properly and correctly. Before discussing the practice of implementing democracy in everyday life, students need to be trained and implemented in class. Class is a laboratory of democracy. If the implementation of democracy is well done in class, it is hoped that the implementation of democracy in everyday life will be good.

The practice of implementing democracy can be practiced during discussions, looking for solutions to problems faced by students. Implementation of democracy when students interact during the learning process (Ren & Li, 2017).

Implementation of democracy when students interact at school, both with educators, principals or fellow friends, and other people in the school environment. In addition, the practice of implementing democracy in state life includes electing the President and Vice President of the Republic of Indonesia.

Problem-Based Learning

Problem-Based Learning is a learning approach that uses real-world problems. Characteristics *Problem-Based Learning* is:

- (a) student-centered, learning in groups, guided by educators who are facilitators, solving problems;
- (b) learning begins, and is framed as an unstructured problem, which must be resolved with argumentation;
- (c) learning in collaborative teams;
- (d) information is learned through integrating *Problem-Based Learning* with scientific arguments;
- (e) students are increasingly independent during learning. *Problem-Based Learning* is learning that is often used to increase interaction, and higher thinking, using problems and student-centered (Choden & Kijkuakul, 2020).

Quick Response Code

QR Code is a two-dimensional matrix symbol consisting of a string of squares arranged in a pattern of larger squares. The width of this square pattern will determine the version of the QR Code ISO/IEC 18004-2015 (Jain, et.al, 2021).

QR Code is a two-dimensional barcode introduced by the Japanese company Denso Wave in 1994. This type of barcode was originally used for inventory data for the production of vehicle parts and is now being used in various fields of business services, as well as for marketing and promotional activities. Basically, the QR Code was developed as a code that allows its contents to be decoded at high speed (Rovillard, 2008).

The advantage of the QR Code is that it can store information horizontally and vertically. Therefore, a QR Code can contain more information than a one-dimensional barcode (Tjahyadi, 2021).

Currently, using the QR Code has been widely implemented in the form of QR Code Raider and QR Code Generator, so it will be very easy for someone to create information in the form of a QR Code. To get the information he wants to know, he only scans and scans data through the media from a cell phone camera (Agustang, et.al, 2021).

Methodology

This research uses the method of *Research and Development (R&D)*, with Dick and Carey's model at the top of the *System Approach Model of Educational Research and Development*.

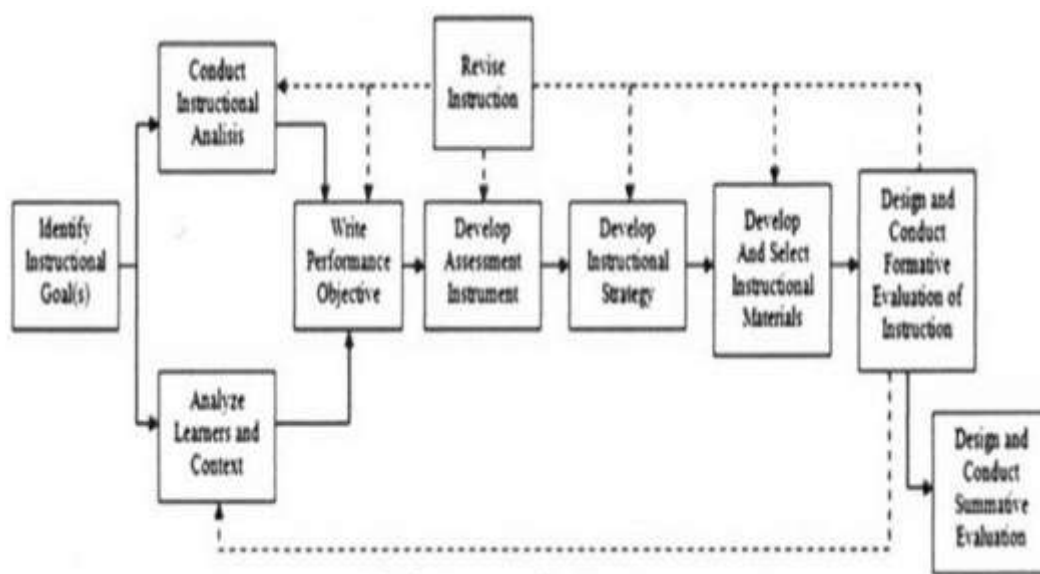


Figure 1. Model Dick & Carey's, 2015

a) Identifying Instructional Objectives (Identify Instructional Goal (s))

The first stage is a needs analysis to determine learning objectives. A needs analysis was carried out by observing and interviewing educators. To determine what students want to master after following the lesson.

b) Performing Instructional Analysis (Conduct Instructional Analysis)

The second stage is to do a learning analysis. This stage serves to recognize the skills of students who will be reached in learning. Determine the steps to achieve the goal, both skills, knowledge, and attitude.

c) Analysing Learners and Context (Analyse Learners and Context)

The third stage is to analyse students in the environment. To identify individual qualities. This can be used as a guide to describe learning strategies.

d) Write Performance Objectives

The fourth stage determines specific learning objectives. To determine the abilities that students will learn, and provide the means to achieve learning objectives. Developed specific goals (*instructional objectives*) that must be mastered by students.

e) Developing Research Instruments (*Develop Assessment Instruments*)

The fifth stage is to develop research instruments, as signs to determine the feasibility of student performance in achieving goals. The success of students in this test will determine whether students have achieved specific goals or not.

f) Developing Instructional Strategies (Develop Instructional Strategy)

Developing instructional strategies which include pre-instructional activities (motivation, goals, and behavioural input), presentation of information (instructional sequences, information, examples), student participation (practice and feedback), and testing (*pre-test* and *post-test*).

g) Developing and Selecting Teaching Materials (Develop and Select Instructional Material)

The seventh stage is implementing learning strategies through democracy-based teaching materials *Problem-Based Learning* and *Quick Response Code*. Explain the general components of a set of learning materials in order to obtain ease in learning.

h) Design and Conduct Formative Evaluation of Instruction

The eighth stage is designing and conducting formative evaluations, to identify whether learning is running effectively. The results of the formative evaluation can be used as input to improve the draft democracy teaching materials and learning programs.

Through formative evaluation, it will be found deficiencies in learning activities. If there are deficiencies can be corrected. In the formative evaluation, a test was carried out one *in one*, small group (*small group*), large sample.

i) Revise Instructional

The ninth stage is to revise the learning program, with the aim of perfecting democracy-based teaching materials *Problem-Based Learning*, and *Quick Response Code*. These teaching materials will be more interesting and effective when used, and the learning objectives that have been set will be well achieved.

j) Designing and Conducting a Summative Evaluation (Design and Conduct Summative Evaluation)

The Tenth Stage is designing and developing a summative evaluation. Summative evaluation is an assessment carried out at the peak of Dick and Carey's model of activity. Assessment decisions are based on effectiveness and efficiency in learning activities. Summative evaluation is directed at the success of achieving the goals that have been set.

The purpose of the formative evaluation is to find out the specific errors of democracy-based teaching materials *Problem-Based Learning* and *Quick Response Code* and to improve them (Dick and

Carey, 2015: p. 285).

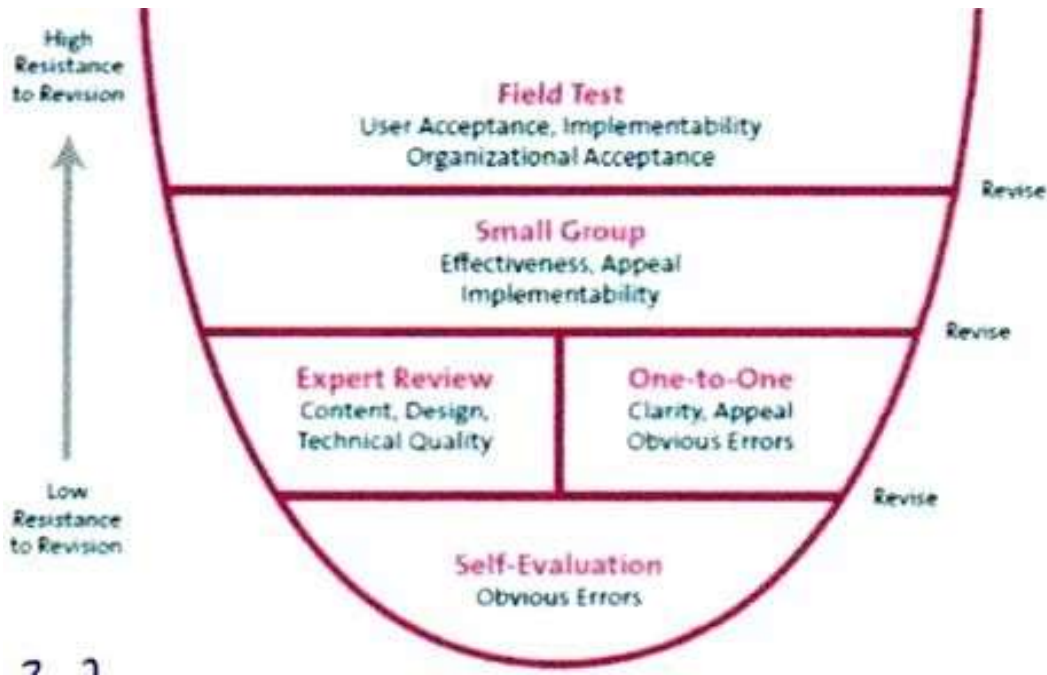


Figure 2. Stages in Conducting Formative Evaluation

(a) Expert Review

Expert reviews are conducted by instructional design experts who will validate the instructional domain. Material experts will validate the materials based on democracy *Problem Based Learning*. Media experts will validate aspects of learning media and quick *Response Codes*. This feasibility test uses a value scale instrument. Is this teaching material product declared feasible or not

(b) One to One Evaluation

One to One Evaluation aims to identify and correct errors in democracy teaching materials and to find out the reactions of respondents. This evaluation was given to 3 students. To represent groups of students above average, moderate ability, and low ability. Data collection techniques in the form of interviews. The results were followed up for the revision of democracy teaching material products, and will then be used in *small group evaluation*.

(c) Small Group Evaluation

Small Group Evaluation aims to follow the errors that are still found in democracy-based teaching materials and *Problem-Based Learning*. At this stage it involved 9 students consisting of 3 people above average, 3 people with moderate abilities, and 3 people with low abilities, using validated and reliable instruments. The results obtained were used to revise democracy-based teaching material products *Problem-Based Learning* and QR Code. Once revised, the product will be used in *field trials*.

(d) Field Trial

Field trials were carried out at the end of the product development process for democracy-based teaching materials *Problem-Based Learning* and QR Code. Conducted in real class involving 40 students. Using yield instruments pretest and posttest tested by t-test. This is to see how

effective the teaching materials on democracy are.

Results and Discussion

40 students were given a pretest to see the initial picture before being given democracy teaching materials. Then the results of the pretest are processed, so that the learning outcomes can be known before the research is carried out.

Democracy-based teaching materials *Problem-Based Learning* and *Code*, reviewed by several experts. Then proceed with the test *one to one*, through interviews related to research products, namely democracy teaching materials. Input from test *one to one* by three students used to revise democracy teaching materials.

Then the teaching materials of democracy are tested in small *groups*. Test Small *group* given to 9 students. Test Small *groups* with instruments. Previously, this instrument was tested for validity and reliability. After being valid and reliable, the instrument is used. Based on the results review from experts to see qualifications by experts, and test results *one to one*, as well as small *group*, then this democracy teaching material is used in this study.

Before learning, students are assigned to scan the QR Code for democracy material, to prepare mentally so that students are better prepared to learn. Scanning the QR Code with a mobile phone can be done anytime and anywhere, both during the learning process and after learning, for example when studying at home independently.

This is in line with Shih-Yuan Huang's research (Shih-Yuan Huang, et.al, 2020) *materials were saved in a quick response code format, which the students could scan with their tablets*. The complete democracy material is stored in the QR Code but due to many requests, and not from students/not Generation Z. The democracy material is also printed by publisher PT Raja Grafindo Persada. The results of the research will be discussed in stages:

1) Research Instrument Requirements Test

Instruments to be used at the time small *group* consists of 15 statement items. This instrument will be tested for validity and reliability. This instrument was tested on 10 students. From these data obtained r_{count} (0.770) while r_{table} (0.632) for $n = 10$ and $\alpha = 0.05$. This means r_{count} (0.770) $>$ (0.632) which indicates valid data.

Then proceed with calculating the reliability, the value of $r_{11} = 0.940$, after consulting the table, it is included in the 0.800 – 1.000 category, so the instrument has very high reliability. Thus the instrument is declared valid and reliable.

2) Feasibility Test of Democracy Teaching Materials Using Problem-Based Learning and Quick Response Code

The results of the study that democratic teaching materials use *Problem-Based Learning* and *quick Response Codes* tested for eligibility (*expert review*) by three experts. The results of the assessment by material experts got a score of 4.82. While the assessment by linguists got a score of 4.8. It was then assessed by media experts with a score of 4.9. It can be concluded that democratic teaching materials use *Problem-Based Learning* and *Quick Response Codes* declared feasible, after being assessed by experts (see attachments 13-15) with an average = 4.84.

3) Test One to One

Test *One to One* given to three students through interviews, related to democracy-based teaching

material products *Problem-Based Learning* and *Quick Response Code*. Test results from *One to One* got a good response and gave good aspirations for the teaching material. With *Problem-Based Learning*, students are trained, and able to solve democratic problems in everyday life. *Quick Response Code* The benefit is that students can study anytime and anywhere by scanning the QRCode.

4) Small Sample Test (Small Group Evaluation)

Test *Small Group Evaluation* is given to 9 students. It consists of 3 students who get the highest scores, 3 students who get moderate scores, and 3 students who get low scores. Based on the results of a small sample, the average value is 4.7.

5) Large Sample Test (Field Trial)

To see the effectiveness of democracy-based teaching materials *Problem-Based Learning* and *Quick Response Code*, given to 40 students. Of the 40 students, 22 were female (55%) and 18 were male (45%).

Before further processing the data from 40 students, a normality test was carried out. The normality test was performed using the Kolmogorov-Smirnov and Shapiro-Wilk, on the data pretest and post-test. The results are normally distributed data because the significance value on the Shapiro-Wilk test is good for the data pretest-posttest less than 0.05. See the results of the test of normality below.

Test of Normality

Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df
Pretest Posttest	.121.128	40 40	.143 .099	.968 .947	40 40

a. Lilliefors Significance Correction

The data is normally distributed because of the significance value on the Shapiro-Wilk test with data from 40 students both at the pretest post-test less than 0.05.

Based on normally distributed data, the average score protest before using democracy-based teaching materials *Problem-Based Learning* = 63.95, with a standard deviation = 5.32.

As for the data posttest, namely after learning using democracy-based teaching materials *Problem-Based Learning*, and *Quick Response Code*, the mean score = 90.38, with a standard deviation = 6.05. (See below).

Paired Samples Statistics

		Mean	N	Std Deviation	Std Error Mean
Pair 1	Post-test	90.3750	40 40	6.05398	5.32026
	Pretest	63.9500			.95722 .84121

The mean posttest result was 90.38 and the pretest result average was 63.95

Improving learning outcomes using democracy-based teaching materials *Problem-Based Learning* and *quick Response Code* overall of 26.43.

This result is in line with Mustafa Fidan's research results that PBL activities improve student learning outcomes and encourage their positive attitude towards physics subjects (Fidan, et.al, 2020). For more details, data *pretest* This can be illustrated via the histogram below.

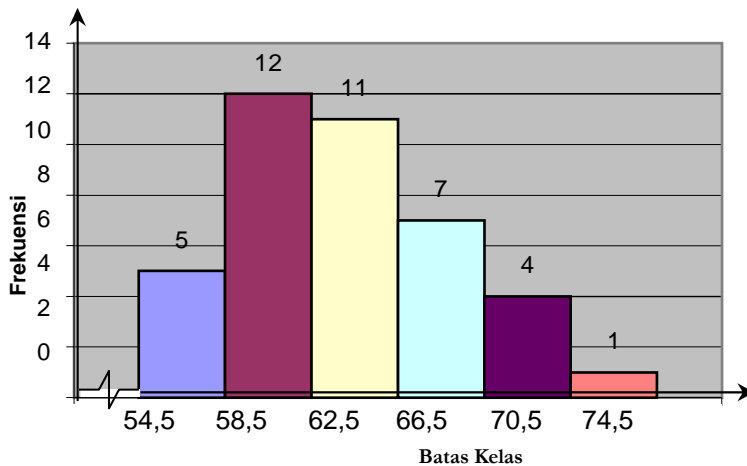


Figure 3. Histogram of data *Pretest*

Meanwhile Data *post test* This can be illustrated via the histogram below

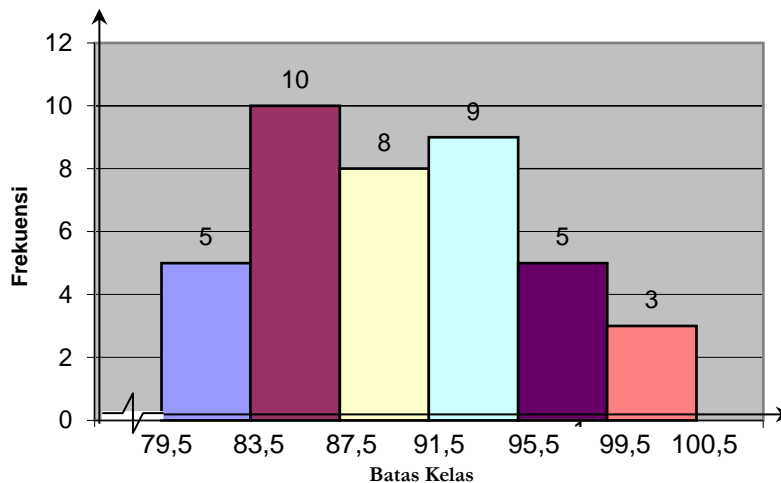


Figure 4. Histogram *Posttest*

To see the effectiveness of democracy-based teaching materials *Problem Based Learning* and quick *Response Code*, a t-test was performed

Paired Samples Test

Paired Differences								
95% Confidence Interval of the Difference								
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Say (2-tailed)
Pair 1 Post_test- pretest	26.42500	5.68348	.89864	24.60734	28.24266	29.406	39	.000

Based on the results of the t-test: $t_{\text{valuecount}} = (29,406) > t_{\text{table}} = (2.023)$ at a significant level of

0.05. In other words, t_{count} bigger than t_{table} significantly. By the average difference pretest *dan* posttest of 26.43, thus the teaching materials for democracy are based *Problem-Based Learning* and quick *Response Code* effectively used and can improve learning outcomes by 26.32. This is in line with the results of the study namely, *During the PBL process, instructors have a guiding role in facilitating the information configuration of students rather than transferring the information to them over the last half-century, educators have shown that PBL can be useful and effective to enhance cognitive and effective skill in learning.* (Dolmans, Loyens, Marcq, & Gijbels, 2016; Hmelo-Silver, 2012; Lu, Bridges, Hmelo-Silver, 2014); Savery, 2006).

Conclusion

Based on the results of the study it can be concluded that the development of democracy-based teaching materials *Problem Based Learning* and *Quick Response Code* has been produced. This teaching material was declared feasible by experts with an average score of 4.84. This teaching material is effective after the t-test is carried out at a significance level of 0.05, the value of $t_{\text{count}} = (29,406) > t_{\text{table}} = (2.023)$. By the average difference pretest and posttest equal to = 26.43, and can improve learning outcomes.

This teaching material was submitted by HKI to LPPM UNJ (Institute for Research and Community Service at Jakarta State University), then this teaching material was published by PT Raja Grafindo Persada.

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