

Development of Probing-Prompting Learning Model Assisted by Mathematics Learning Module to Improve Students' Motivation and Mathematics Learning Outcomes

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ABSTRACT

This study has the following objectives: 1) To determine the development of the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and mathematics learning outcomes, 2) To test the effectiveness of the probing-prompting learning model assisted by the mathematics learning module to increase motivation and learning outcomes in mathematics student. This type of research is an RnD (Research and Development) model using the 4-D method that Thiagarajan and Sammel developed, namely the Define, Design, Develop, and Disseminate stages. This research was conducted at SMPN 01 Banjarharjo with a sample of 64 students. Collected data in this study using several instruments, including implementing learning plans, tests, motivation, and student response questionnaires. The results that have been obtained from the research are: 1) the Probing-Prompting learning model assisted by the Learning Module, after being validated and tested, it shows that it is convenient in increasing student motivation and learning outcomes, 2) The application of the Probing-Prompting learning model assisted by the Learning Module, can be said to be effective with an increase that occurred in students' motivation and mathematics learning outcomes.

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1. INTRODUCTION

Education comes from the word "educate" and then gets the prefix "me," which means to maintain and provide training [1]. During class learning, it is necessary to have guiding teachings and leaders regarding morals and mind intelligence. In essence, education is to provide guidance and assistance to students. In Indonesia, education is determined by the age of compulsory education, starting from children to teenagers. Law

number 20 of 2003 concerning the National Education System in article 6 explains that every citizen aged seven to fifteen is required to attend primary education [2].

Education is an essential thing in human life to determine a better future [3]–[10]. Without education, humans will be stupid and left behind by the globalization of changes in every era. With education, humans will try to live their lives well. In the course of life, humans are always required to solve problems that exist throughout their lives. The problem is education or lesson that can be taken by every human being, whereas humans themselves can take lessons from a problem that they pass. In this context, humans are required to become qualified human beings, both in science and religion, so that humans can get through all the conflicts that exist in every journey of their lives.

Learning is a process of origin of education. In the learning process, there are teaching and learning activities [11], [12]. Learning activities are generally carried out between students and teachers [13]–[17]. Learning activities can be active if they can fulfill learning resource facilities [18]. Learning is said to be successful if the learning objectives are in sync with the learning design that has been determined. One of them is that mathematics is an essential field of learning in education.

Mathematics is a field of study found at every level of education, from elementary school (elementary school) to university. Mathematics education is included in one of the categories of requirements as graduation at all levels of education. Mathematics learning that occurs in the classroom given by educators should be engaging, effective, and efficient. In order to form a good learning model, it would be nice if educators chose learning models, management arts, media, approaches, and learning methods. That way, students will feel happy participating in learning, where they will be more active, creative, and focused on a lesson, and in the end, students can apply it in real life to solve their problems. However, in reality, many students are afraid of mathematics and think that mathematics is difficult to learn, and even children's motivation to learn decreases when mathematics lessons occur.

Things like that cause students to be lazy and lack the enthusiasm to learn math lessons because their mindset already thinks math is complicated. On the other hand, the 2013 curriculum emphasizes that children develop abilities and play an active role when learning occurs. Because basically, learning is also not enough to hear and see but must be accompanied by others, such as asking questions and opinions, doing assignments, drawing, reading, discussing, presenting, concluding, and using existing learning media properly.

Therefore, teachers must be able to create innovative learning models that support motivation and influence student learning outcomes, one of which is the probing prompting learning model. Probing-prompting is learning where a teacher presents a series of questions guiding and exploring so students can think and gain the knowledge being studied [19]–[27]. Furthermore, students construct concepts, principles, or rules into new knowledge so that new knowledge is not notified [28].

By applying the probing-prompting model, the teacher will become a student facilitator in learning, exploring students' thinking skills and student activity in learning that is demanded as the curriculum is applied. Because, indirectly, probing-prompting learning

influences students' motivation and learning outcomes after learning takes place. This statement is reinforced by Sari [29], which concludes that applying the probing-prompting learning model can increase students' motivation to learn mathematics in class VIII F SMP Negeri 1 Babadan [30], which concluded that the Probing-Prompting learning model could make students active in learning and have an impact on improving student learning outcomes.

In addition, learning mathematics has learning tools consisting of a syllabus, lesson plans, teaching materials, learning media, and learning modules. Nevertheless, in reality, not all learning tools are used by teachers. In reality, learning tools are less available during the teaching and learning process, which causes students to only focus on one step to solve a given problem. With several devices, the module is one of the practical tools that can be used in learning. In addition, modules are exciting and systematically organized material, including methods, content, and ratings that can be used independently. Learning by using the module, students will focus on the material already in the module so that they are no longer confused about what should be studied, even though they study individually at home. In addition, the module can help the learning process practically both at home and at school.

With the results described above, the authors are interested in developing a more efficient model to encourage students to increase motivation and learning outcomes. The model that will be used is a probing-prompting learning model with the help of a learning module, which has the following objectives; to find out the development of the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and learning outcomes in mathematics, to test the effectiveness of students after applying the probing-prompting learning model assisted by the mathematics learning module to improve students' motivation and learning outcomes in mathematics.

2. METHOD

The type of research used in this study is descriptive qualitative-quantitative research that uses a development research approach design and a Research And Development (RnD) research design. RnD development is a process of developing educational institutions through a series of research using various methods in a cycle that goes through various stages [31]. The RnD model used in this research is 4-D, namely the Define Phase, the Design Phase, the Develop Phase, and the Disseminate Phase.

The research's product trial design applies a limited experimental test. For the application of product trials, researchers need two classes. The first is the experimental class, where this class gets a probing-prompting learning treatment assisted by a mathematics learning module to increase students' motivation and learning outcomes. Meanwhile, the second class is the control class, where this class is treated with the probing-prompting learning application that is commonly used. The design used in this research is the Nonequivalent Control Group Design.

Table 1. Trial design

Pretest	Treatment	Posttest
O ₁	X ₁	O ₃
O ₂	X ₂	O ₄

The step in this research is to set one experimental class and one control class. The control class uses probing-prompting learning with the help of mathematics learning modules, while the control class uses the usual probing-prompting lesson.

This research will be located at SMP N 01 Banjarharjo, Brebes Regency, Central Java. This research will be carried out in the odd semester of 2021/2022. According to the Indonesian dictionary, research subjects are people, places, or objects observed in the context of making targets. The subjects in this study were class VIII, totaling 64 students, who were conducted at SMPN 01 Banjarharjo. The object to be studied is the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and learning outcomes in mathematics.

3. RESULTS AND DISCUSSION

Effectiveness is a measure of improvement before and after treatment is applied. The objectives of developing the probing prompting learning model assisted by the mathematics learning module include:

3.1. To find out the development of the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and mathematics learning outcomes

To find out the first objective, the author has several steps, including the initial analysis used to analyze existing problems based on existing facts to examine the development of probing-prompting learning models assisted by mathematics learning modules to increase students' motivation and learning outcomes in mathematics. Next is student analysis, which is carried out to determine students' characteristics, abilities, backgrounds, and levels of student's cognitive abilities. Afterward, proceed to the task analysis used to determine the content of the material to be taught with an outline of the Core Competencies and Basic Competencies with the help of the mathematics learning module. Continue to concept analysis, which is to identify and arrange systematically in order to achieve particular competencies that have been arranged. Furthermore, do not forget to analyze the learning objectives to determine learning achievement indicators based on material and curriculum analysis. With the analysis of learning objectives, researchers will find out what is in the development of probing-prompting learning to achieve the expected learning objectives.

The next stage is the Design stage. In the planning stage, there are three steps: the preparation of tests used to measure instruments to determine students' mathematics learning outcomes. The selection of media that is useful for modifications in learning that can facilitate the learning used media used is a mathematics learning module after the researcher proceeds to the stage of selecting the format as a design for the development of the learning model to be studied, which is the selection of pretest, post-test, and questionnaire formats.

Next is the Develop stage. Development stage there are three stages. The first is the instrument validation stage, where this instrument is validated by supervisors, media

experts, and material experts aiming to get the results of the product to be developed. In addition, in the assessment of product development validation, which is in the form of RPP as follows, it has an average of 1.00 which means it has high validity. For learning modules using pre-existing modules, researchers do not need to validate.

Next is the learning instrument validator, which at this stage only justifies the inappropriate language pattern used. For the rest, there are no revisions, indicating that the instrument used is valid to be applied in research.

The next stage is testing the instrument that has been made in a limited way. The trial was carried out in class IX B, where the number of respondents was 36 students. Based on the results obtained from the learning motivation questionnaire test of 20 statements, all of the results are valid, and for the learning outcomes test, which totals 20 multiple choice questions, only 17 valid questions are valid for use in the study.

Next is the product trial that will be developed, where this trial is carried out in class VIII H, with a total of 32 students. This class will use a probing-prompting learning model assisted by a mathematics learning module to improve students' motivation and learning outcomes in mathematics. The learning process is that students are given a new atmosphere by the teacher, with the help of a mathematics learning module, to pay attention to pictures, formulations, or problematic situations. The teacher gives students time to formulate answers or discussions with the help of the mathematics learning module. Students are given appropriate questions by an inductor to achieve learning objectives. After the teacher gives the students time to complete answers in a discussion, choose one student to answer the questions that have been given. The teacher responds to other students if the student who answers gives the correct answer to convince and involves all students when learning takes place. However, if a student answers a question that is not very accurate, inaccurate, or silent, the teacher will ask another question to guide the way to solving the question—followed by questions that require students to think at a higher level until they can answer questions according to their abilities and indicators. In the following question, different students are given questions so that all students can actively participate in module-assisted probing prompting learning. Mathematics and final questions are addressed to different students to emphasize learning objectives or indicators that all students fully understand.

It can be concluded that the research results are the development of a probing prompting learning model assisted by a learning module after validation and testing, and other tests show that it is convenient in increasing student motivation and learning outcomes. For data on the results of increasing student learning motivation, the data obtained are based on research in which there is a questionnaire on initial motivation and final motivation after learning occurs. The researchers did several tests, the first was expert validity, then continued with validity and reliability data analysis. Later, after learning, a questionnaire was given to students after the researchers calculated using a scale to get initial and final data.

Table 2. Recapitulation of the initial and final indicator questionnaire

Indicator	Initial Questionnaire	Final Questionnaire
Desire and desire to succeed	62% (good)	69.56% (good)
The drive and need for learning	57.08% (good)	68.75% (good)
Dreams and hopes for the future	60.56% (good)	69.63% (good)
Appreciation in learning	64.44% (good)	78.33% (very good)
Interesting activities in learning and attention to learning	61.81% (good)	69.86% (good)
Conducive learning environment	61.11% (good)	69.26% (good)
Average	61.17% (good)	70.90% (good)

The initial data on the learning motivation questionnaire, which has an overall value of various indicators, is 61.17%, showing that motivation is in the excellent category. Furthermore, the motivation questionnaire finally has an average overall score of 70.90%, each having good criteria. It can be concluded that the application of the probing-prompting learning model assisted by the mathematics learning module has increased learning motivation.

Likewise, supporting data in the form of student response questionnaires, which have a value of 59.08% of the average ten indicators, can be said to be in a suitable category. That result indicates that the probing-prompting model development assisted by the mathematics learning module is suitable for application in mathematics learning.

3.2. For the second purpose of the study, namely to test the effectiveness of students after applying the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and learning outcomes in mathematics.

Effectiveness is a measure of improvement before and after treatment is applied. In this study, following the objectives to be achieved, the researcher determined the effectiveness of the probing-prompting learning model assisted by the mathematics learning module.

The data obtained are data from the results of the Pretest-Posttest given to the experimental class and the control class. The test carried out at this stage was the first, namely the expert validation test, then the instrument was tested, then processed to find the validity value of each question using Microsoft Excel, and it was found that from 20 multiple choice questions that were valid and suitable to be used, there were 17 questions.

Based on the normality test, which was analyzed on the SPSS V.20 software, the experimental class and control class data tested using the Shapiro Wilk test with a significance level of 5% were data that were normally distributed because in the control class, the sig value > 0.05 , it can be concluded that the learning outcomes test students' mathematics has met the requirements or can be said to be normally distributed because the control class scores sig > 0.05 . The homogeneity test is carried out to determine whether some variants of the data population are identical. If the significant value is greater than 0.05, it can be stated that the variances of two or more groups are the same. In this homogeneity test, the researcher used the Levene test method with a

significance level of 5%. Next to the independent test sample the t-test. Based on this test, it formulated a hypothesis in which the value of the pre-posttest for the experimental and control classes is sig 0.000. So it can be concluded that there is an average difference between learning outcomes with the pretest and post-test, which means that there is no effect of using the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and mathematics learning outcomes.

Next, the N-Gain test determines the effectiveness of the learning model developed by the researcher. Where the test is given both before and after the learning takes place, the experimental class has the original N-Gain value of 37.16, then increased to 0.71, which means it is included in the high category, while the control class has an N-Gain value from the initial value. 11.66 to 0.18, which is in the low category. From some of the data obtained, it can be concluded that the probing-prompting learning model assisted by the mathematics learning module is a device or product that can be used an increase students' motivation and mathematics learning outcomes in learning.

From several tests passed by the researcher, then the researcher can conclude that the application of the probing-prompting learning model assisted by the learning module can be said to be effective with an increase in students' motivation and learning outcomes in mathematics.

The data for Student Learning Test Improvement Results are from the pretest and post-test results given to the experimental and control classes. The test carried out at this stage was the first, namely the expert validation test, then the instrument was tested, then processed to find the validity value of each question using Microsoft Excel, and it was found that from 20 multiple choice questions that were valid and feasible to use, there were 17 questions.

Based on the normality test, which was analyzed on the SPSS V.20d software, the experimental class and the control class were tested using the Shapiro Wilk test with a significance level of 5%, which is data that is normally distributed because in the control class the value of sig > 0.05, it can be concluded that the learning outcomes test students' mathematics has met the requirements or can be said to be normally distributed because the control class scores sig > 0.05. Continue the homogeneity test to find out if some variants of the data population are identical. If the significant value is greater than 0.05, then it can be stated that the variance of two or more groups is the same. In this homogeneity test, the researcher used the Levene test method with a significance level of 5%.

Next to the independent test sample the t-test. Based on this test, it formulated a hypothesis where the value of the pre-posttest experimental class and control class is obtained sig 0.000. So it can be concluded that there is an average difference between learning outcomes with the pretest and post-test, which means that there is no effect of using the probing-prompting learning model assisted by the mathematics learning module to increase students' motivation and mathematics learning outcomes.

Next, the N-Gain test determines the effectiveness of the learning model developed by the researcher.

Table 3. N-Gain test

Class	N-gain	Category
Experiment	0,71	High
Control	0,18	Low

Where the test is given both before and after the learning takes place, the experimental class has the original N-Gain value of 37.16, then increased to 0.71, which means it is included in the high category, while the control class has an N-Gain value from the initial value. 11.66 to 0.18, which is in the low category. From some of the data obtained, it can be concluded that the probing-prompting learning model assisted by the mathematics learning module is a device or product that can be used an increase students' motivation and mathematics learning outcomes in learning.

From several tests that the researcher has passed, then the researcher can conclude that the application of the probing-prompting learning model assisted by the learning module can be said to be effective with an increase in students' motivation and learning outcomes in mathematics.

4. CONCLUSION

Based on the results of research on the development of a probing-prompting learning model assisted by a mathematics learning module to increase students' motivation and learning outcomes in mathematics learning conducted at SMPN 01 Banjarharjo in 2022, it can be concluded that (1) the development of a probing-prompting learning model assisted by a learning module, after validated and tested showing that it is convenient in increasing students' motivation and learning outcomes (2) The application of the probing-prompting learning model assisted by the learning module can be said to be effective with an increase in students' motivation and learning outcomes in mathematics.

Based on the research results obtained in this study, the following suggestions can be given for applying a more creative and appropriate learning model, one of which is the probing-prompting learning model assisted by the mathematics learning module, utilizing the mathematics learning module in the application of probing-prompting learning in mathematics learning. Increase the practice of math problems, and do not hesitate to express their opinions to improve their mathematics learning outcomes. Subsequent research can be used in other mathematical subjects and tested in several schools, after which an evaluation is carried out based on the existing trial pilgrimage.

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