# Development of Discussion Learning Methods Assisted QR & Barcode Scanner

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**Abstract**. Along with the rapid development of technology, it will be very influential in various aspects of life. This is no exception in the field of education, which will inevitably affect the learning process with the involvement of the results of technological developments that can be used as support in teaching and learning activities. Teachers are required to be creative and innovative in managing learning by utilizing technological developments that are in accordance with the characteristics of students. There are many applications and features that we can choose that make partners in the learning methods that we have used so far in learning. Therefore the development of discussion learning methods assisted by QR & barcode scanners is an alternative innovation that is quite relevant to the characteristics of students and technological developments. Development of discussion learning methods assisted by QR & barcode scanners through research and development by testing product effectiveness through product feasibility analysis, product practicality analysis, and analysis of test value data using quasi-experimental, resulting in a hypothesis conclusion where the discussion learning method assisted by QR & barcode scanners is valid and practical to increase student motivation and achievement.

**Keywords**: Discussion Learning Method, QR & barcode scanner, Motivation, Achievement

## 1 Introduction

In learning, many things affect the achievement of the expected goals, namely the selection of approaches, models, strategies, and methods used in the learning. Teachers must be able to make learning good, fun, and not boring. If students can properly understand the subject matter, especially mathematics taught by the teacher, then their motivation and enthusiasm will be able to develop properly as one of the supports for their level of learning achievement.

Selection and use of appropriate learning methods, in accordance with the characteristics and abilities of students, make teaching and learning activities effective and efficient and feels comfortable. The learning method is an orderly and systematic process carried out by the teacher in teaching and learning activities related to the delivery of subject matter to students or that the learning method is a strategy or trick in carrying out teaching and learning activities so that the objectives of the learning that have been set can be realized properly. There are several kinds of learning methods that can be chosen by the teacher, one of which is the discussion learning method, which is a method that always relies on discussion activities in solving problems

involving students which is usually done by forming discussion groups. However, learning with the monotonous discussion learning method is considered less relevant to current technological developments, there is a need for development and innovation as a refresher and a bit of a new and more enjoyable sensation from the discussion learning method as an effort to further increase student motivation and achievement. Therefore a development and innovation solution is offered, namely by using a discussion learning method assisted by a QR & barcode scanner, a slightly modified discussion learning method by utilizing the QR & barcode scanner application.

Based on the identification and limitation of the problem that in general the discussion learning method is a fairly effective learning method, but along with the development of the era the discussion learning method is felt to be less or even irrelevant in the digital era as it is today, so there needs to be development and innovation, the problem is formulated as follows: (1) What are the needs of students, (2) What is the hypothetical model for developing QR & barcode scanner-assisted discussion learning methods, (3) What is the final model for developing QR & barcode scanner-assisted learning methods, (4) Is there an increase motivation and learning achievement of students after implementing the discussion learning method assisted by QR & barcode scanners, especially in Mathematics.

## 2 Method

In this research, the research and development model presented by Samsudi was used. According to Borg and Gall, conceptually the research and development approach includes 10 general steps. In its implementation the ten steps are often grouped into three main steps as stated by Samsudi [1], namely:

a. Preliminary study which includes: literature study, study/collection of field data relating to the problem to be solved, and description and analysis of field findings.
b. The development stage consists of the following steps: Formulating a development plan; Deciding the objectives to be achieved in each stage of development and planning a limited feasibility study; Develop the initial formulation (design) of the product to be developed; Involving several research subjects; and conduct primary trials involving a wider audience (audience and subject). At this stage a quantitative approach was used with a pre-experimental research design in the form of a one-group pretest-posttest design as presented by Borg & Gall quoted by Samsudi [1] . The pre-experimental research design chart is as follows:

**Table 1.** One Group Pretest-Posttest Design

| Pretes | Treatment (Independent Variabel) | Pascates |
|---|---|---|
| Y | X | Y |

From these results, improvements will be made, so that the design of the development model is a model that is ready to be tested for validation.

c. The validation stage includes the steps: testing the results of the development and validating the product, and making improvements in order to finalize the final product, by implementing a quasi-experimental research or quasi-experimental with a "pretest-posttest with control group design."

| group | Prates | Treatment (Independent Variabel) | Pascates (Dependent Variabel) |
|---|---|---|---|
| Eksperimen | Y1 | X | Y2 |
| control | Y1 | -- | Y2 |

Table 2. Pre-test-posttest design without randomized control group.

In this stage, final improvements are made to the model developed based on the results of the validation test, the improvements are only perfect. Overall the flow of research and development is described in the following chart:

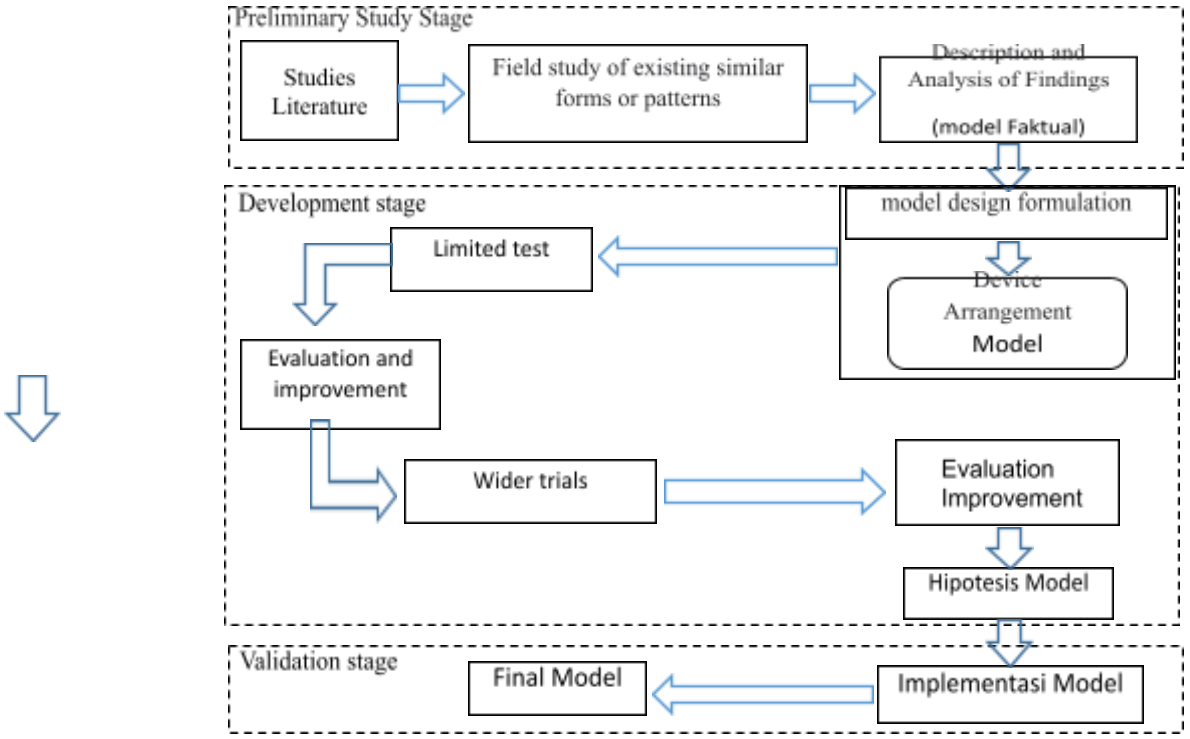


Chart 1. Reaserch and development three steps.

In this study, the validating subjects were method expert lecturers and IT experts, who had academic criteria and experience with certain criteria. The criteria for each are as follows:

**Tabel 3.** Criteria for expert trail subjek.

| No | Validation | Criteria | Expert field |
|---|---|---|---|
| 1. | Learning Method's Lecturer | S2 gradude minimum | Learning Method expert |

| No | Validation | Criteria | Expert field |
|---|---|---|---|
| 2. | Informatics and Technologies Lecturer | S2 gradude minimum | Informatics and Technology expert |

While the implementation subjects of this research and development were math teachers at SMK N 1 Warureja and class XI students at SMK N 1 Warureja, Tegal Regency, totaling 72 people. In this research and development, the object of research is the Discussion Learning Method assisted by QR & barcode scanners.

The population according to Sugiyono[2], is a generalization area consisting of: objects and subjects that have certain qualities and characteristics determined by researchers to be studied and then conclusions drawn. In this study the population was students of SMK Negeri 1 Warureja. Meanwhile, according to Sugiyono [2], the sample is part of the number and characteristics of the population. The sample taken must be representative or representative of the population. The sampling technique is a sampling technique. According to Riduwan [3] sampling technique or sampling technique is a way of taking a representative sample from the population. Sampling must be done in such a way as to obtain a sample that can truly represent and describe the state of the population.

In general, there are two kinds of sampling techniques in research, namely random sampling or random sampling which is known as probability sampling and nonrandom sampling or non-random sampling which is also known as nonprobability sampling. In this study, researchers used nonprobability sampling, which is a sampling technique that does not provide equal opportunities/opportunities for each element or member of the population to be selected as a sample, as revealed by Sugiyono [4] . In this case the researcher uses Purposive Sampling, according to Sugiyono [4] which is a sampling technique with certain considerations. From a total of 408 students in class XI, a sample of class XI AKL (Institutional Financial Accounting) 2 and 3 of SMK Negeri 1 Warureja totaled 72 students, with the consideration that this class had less motivation and achievement compared to other classes.

Hypothesis testing using data analysis techniques used in this experimental research is t-test or t-test data analysis. The data analyzed through the t-test is realized in the form of numbers. This technique aims to determine differences in the actualization of character values between the experimental class that was given treatment and the control class that was not given treatment. The t test formula is as follows [5]:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{SD_1^2}{N_1 - 1}\right) + \left(\frac{SD_2^2}{N_2 - 1}\right)}}$$

Description:

$\bar{x}_1$ : mean in the distribution of sample 1

$\bar{x}_2$ : mean in the distribution of sample 2

N1 : number of individuals in sample 1

N2 : number of individuals in sample 2

$SD_1^2$ : variance value in sample 1 distribution

$SD_2^2$ : variance value in sample 2 distribution

At a significance level of 5%, the calculation results with the t-test formula are consulted with the ttable prices. If t-count is greater than t-table, it can be concluded that the hypothesis is accepted with the provisions: If $t_0 \geq$ t-table then the null hypothesis ($H_0$) is rejected, meaning that there is a significant effect of the discussion learning method assisted by QR & barcode scanners on learning achievement and If $t_0 <$ ttable, then $H_0$ is accepted, meaning that there is no significant effect of the discussion learning method assisted by QR & barcode scanners on learning achievement.

## 3 Result and Discussion

The discussion learning method assisted by the QR & barcode scanner developed in this study aims to increase motivation and achievement in learning mathematics at SMK Negeri 1 Warureja, Tegal district. This research and development is also carried out to find out how the feasibility of the hypothetical model and its effectiveness for teachers and its application to students. According to Gay [6] says that the main goal in research and development is not to test hypotheses but to produce educational products that can be effectively utilized by school observers. So that the results of the hypotheses will not have a significant effect but only as a comparison regarding classes that use and those that don't, because in educational production it is used as new knowledge.

From what was conveyed by Samsudi in three steps it can be described as follows, that what must be done at the beginning is through (1) a preliminary study, at this stage the author conducts a preliminary analysis related to learning using the discussion learning method which is felt to be less relevant to the current conditions, thus resulting in decreased motivation and student achievement. The initial indication of this problem occurring is a decrease in learning motivation and a decrease in student achievement in discussion activities because there is boredom and a lack of student motivation in learning mathematics. To obtain results in the initial analysis of needs, the authors need an instrument design prior to development in the form of questions related to needs analysis in fulfilling learning problem solving through questionnaires or questionnaires. The questionnaire was distributed to students before and after research and development, to find out how far the problem could be resolved.

To support in strengthening the theoretical foundation of research and development, the authors through literacy studies are looking for references that are relevant to the problems developed in research and development related to learning methods, namely discussion learning methods and the use of QR & barcode scanner applications in the learning process.

(2) The development stage, at this stage starting from designing product development, how to develop discussion learning methods in mathematics with the help of a QR & barcode scanner application. There are quite visible differences from the chart below regarding the procedure for implementing the discussion learning method before and after the help of the QR & barcode scanner application.

**Table 4.** Differences in the procedures for implementing the discussion learning method before and after the assistance of the QR & barcode scanner

| Method | Syntax of Discussion Learning Method Pre | Syntax of Discussion Learning Method Post |
|---|---|---|
| Preparatory Steps | 1. The issues discussed are well planned. | 1. The problem being discussed is well planned, making a QR or barcode of the problem to be |

| Method | Syntax of Discussion Learning Method Pre | Syntax of Discussion Learning Method Post |
|---|---|---|
| | | discussed and placing the QR or barcode in a certain place, preparing a clue to make it easier for students to find the QR or barcode containing the problem. |
| Implementation | 1. Carry out discussions according to the problems planned and follow the rules of the game that have been set.<br>2. Stimulating students so that discussions can be volatile, while paying attention to the learning atmosphere remains full of enthusiasm and fun. | 1. Carry out discussions with planned problems and provide clues so students can find the first QR & barcode containing the problem and the next clue.<br>2. Students are outside the room, in the environment around the school with their groups to find the problem behind the QR & barcode and to be able to solve it students must scan it with the QR & barcode reader application, which is then resolved by discussing with the group, and continuing to look for QR & other barcodes based on the next clue. |
| Closing | 1. Presenting the results of the discussion. | 1. Presenting the results of the discussion of how many QR & barcodes were found and completed. |

(3) The validation stage, at this stage it is carried out to get a conclusion whether the model being developed is effective and efficient. At the product development stage and the effectiveness test stage there will be revisions or improvements because the improvement process will go hand in hand with the validity data from experts. A systematic description of the stages of the QR & barcode scanner-assisted discussion learning method can be seen in the image below:

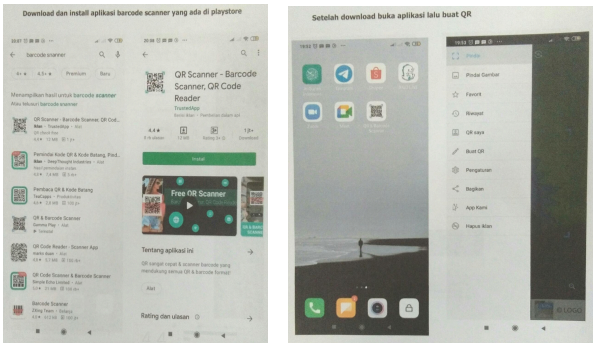


**Figure 1.** Stages of installing the QR & barcode scanner application

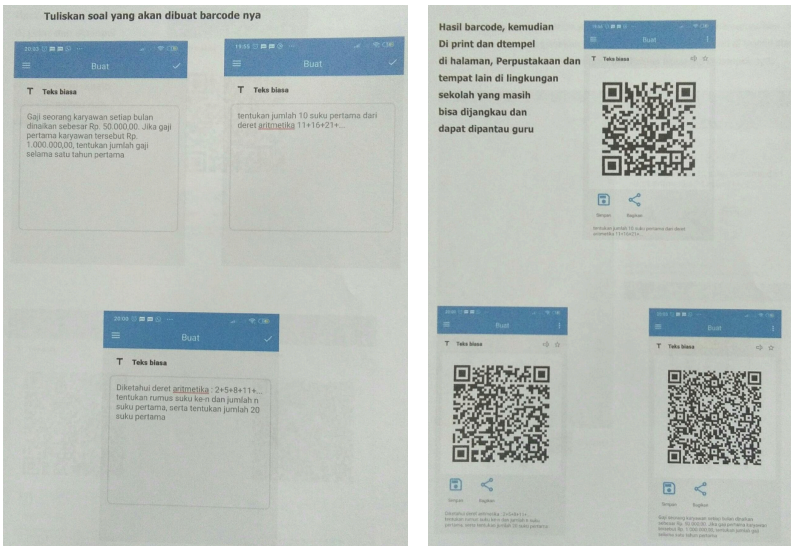


**Figure 2.** The stages of making a QR code from the problems that will be the subject of discussion

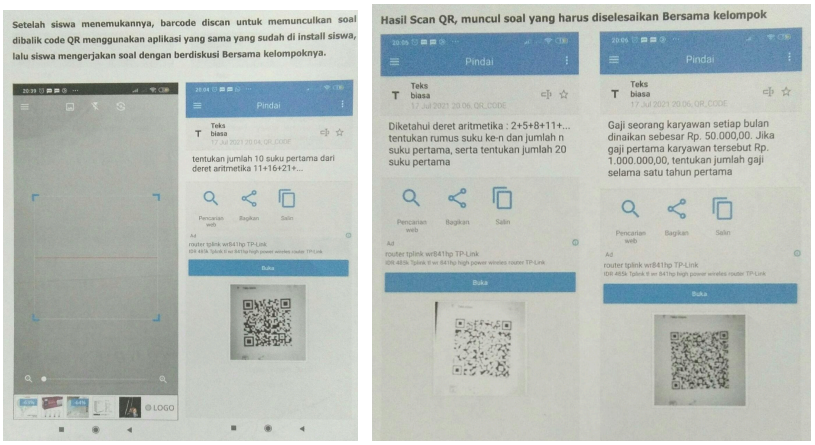


**Figure 3.** The stage of scanning the QR code to get the problem that is the subject of discussion

At the effectiveness test stage is to pay attention to product feasibility, namely aspects of method steps, presentation aspects, convenience aspects, curriculum aspects accompanied by question items. From this test, the feasibility aspect of the method step resulted in 80%, presentation 88%, convenience 82%, and curriculum feasibility 85% so that the average product feasibility was 83.75% and if converted the validity was valid. Meanwhile, when viewed from the practicality aspect of 82%, the convenience aspect of 85% and the usefulness aspect of 85%, this becomes data which shows that the product can be used in a very practical, easy and beneficial way. The assessment begins with instrument validation by experts in their fields, namely IT experts and learning method experts with a minimum educational qualification of S2.

Based on the data that has been obtained, it is followed up by testing through t-test and triangulation so that it appears that there is a relationship between the influence of the use of the

discussion learning method assisted by QR & barcode scanners. As a result of the development of learning methods on the motivation and learning achievement of students.

## 4 Conclusion

Research and development of discussion learning methods assisted by QR & barcode scanners in mathematics at SMK Negeri 1 Warureja Tegal Regency have been carried out by researchers and declared valid by the stages of assessment from the validators. In the aspect of product feasibility to be used in learning activities with an average value of 83.75 and the results of the conversion of the validity of the value are included in the valid category. Whereas in the analysis of practicality, convenience and usefulness with a value of 85 and is included in the very practical category. The increase is quite visible from the motivation of students which affects learning achievement, so based on the results of the hypothesis it can be stated that the development of discussion learning methods assisted by QR & barcode scanners in mathematics subjects to increase motivation and learning achievement of class XI students of SMK Negeri 1 Warureja is practical and valid.

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