

DEVELOPMENT OF LEARNING INSTRUMENT WITH EDUCATION GAME MEDIA IN TRANSFORMATION TO INCREASE STUDENT LEARNING MOTIVATION

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ABSTRACT

This research is the development research that adapts 4D model. Purpose of this research was to develop learning instrument use educational game media in transformation to increase student's motivation. The steps that already did in this research are defined, design and develop. In this research, data were obtained on score of student's learning outcomes, self-assessment sheet score, motivation questionnaire score and assessment score by validators. The last assessment is generally shown that learning instrument that consist media and lesson plan can be used with little revision and more than 75% the number of student can categorize in able and very able to use media, so that it can be said that learning instrument include practical criteria. Student's learning outcome test shown that more than 75% students passed learning outcomes. The result from measuring of student's learning motivation shown that 79.3% students get increasing of learning motivation, so instrument can categorize effective instrument.

INTRODUCTION

Most teachers want a class full of intrinsically motivated students. But the reality is often not same (Slameto, 2003, p.173). From these facts, teacher should be able to motivate students in extrinsic by doing variations in the learning process that aims to increase students' intrinsic motivation.

According to John Huizinga in Indradi (2014) Every people is homo ludens which means people is a gamer, so the instinct of play remains attached to a person, from childhood to adulthood, so that teachers can package a fun and challenging learning in an educational game .

This day many students find mathematics a difficult subject, unpleasant, even a frightening specter (Sundayana, 2014, p.2). Transformation is one of the material in mathematics which is the students have difficulty in learning, because in the

transformation material there are many concepts and formulas that must understanding and memorizing by students in order to solve the problem of transformation. This is reinforced by the results of Hadiprasetyo (2004) study which states that student achievement is low on the subject of transformation.

Dreyden & Vos in Indradi (2014) stated that learning is not enough by listening to the explanation from the teacher. Therefore teachers need an exercise given to students, whose goal is to give reinforcement of the concepts that students get and can improve students' ability in solving problems related to the concept that student get before. In the general mathematics learning process, the teacher asks students to do the exercises after the teacher explains the concepts, gives examples and discusses examples of problems (Sundayana, 2014, p.24). Monotonous learning activities cause students' learning motivation in

learning math is decrease, therefore a teacher can use educational game as a the process of training done by students.

According to Hirumi (2010) another function of the use of educational games in learning is to improve students' learning motivation. Media game education is a media that can make students feel happy when learning and do not feel a burden, it happend because every students activity will be done with fun. Indeed everything done with a happy feeling of the outcome will be more maximized than done with unhappy feeling (Indradi, 2014, p.10).

Based on the above background, researchers interested in designing a fun learning by using the game as a media in learning mathematics.

In the case of the implementation of mathematics learning using game media, it is needed supporting learning intrument such as RPP and game media, so that researchers will develop learning instrument with educational game media on transformation to improve students' learning motivation.

The purpose of this research is to describe development process and produce instructional instrumen with good education game media in transformation material to improve student's learning motivation.

From the results of this study is expected to provide benefits that the results of the development of educational game media produced, teacher can be used as an alternative media to train students' skills in solving problems related to the material transformation sub reflection material and for other researchers, the results of this study can be used as reference.

Howard L. Kingsleny defines learning "Learning is the process by which behavior (In the border sense) is originated or changed through practice or training" (Baharudin, 2009, p.163). From Howard's statement can be concluded that learning is a process when behavior is caused or changed, one way through practice or training. The purpose of the exercise in the

learning process is to train students' ability to solve problems related to the concept of reflection obtained.

When a teacher and student want to do learning in the classroom is required a learning instrument, because according to Khabibah (2006, p.48) learning instrument as a collection of learning resources that allow teachers and students to do learning activities. Learning instrument developed in this study include lesson plan and educational game media.

Grandmont (2010, p.172) states that, "Pedagogical game in which the purpose is directed toward the need to learn". From Garndmont's statement it can be concluded that the educational game is a game related to education whose purpose is clearly directed to the learning needs. The learning requirement in question is the need to knowing and understanding something about the material to be studied, because in the theory of needs that has been expressed by Maslow in Slameto (2003), there is a need called the need to know and understand.

There are several types of educational games, but Budiarto (2005) distinguishes the educational game in learning mathematics based on their usefulness into three types of games, among others;

- a. Mathematical game that can help students construct a certain mathematical concept.
- b. The mathematical game students use to understand and train a mathematical concept.
- c. Games that directly or indirectly use the concepts of mathematics.

The game developed in this research is a second type game, a mathematical game used to understand and train certain mathematical concepts. The purpose of train the concept here is that students are given training in the form of games so they can train students' skills in using the concept of reflection to solve problems related to reflection

Although motivation is a force or energy but motivation is something we can

observe. Some steps we can do is to identify some of the indicators that appear in students, as follows:

- a. Duration of activities.
- b. Frequency of activity.
- c. Persistence.
- d. Firmness, tenacity, ability in facing obstacles and difficulty reaching goals.
- e. Devotion and sacrifice.
- f. Level of aspiration. The level of qualification of achievement or product or output achieved from its activities.
- g. Direction of attitude toward the target of activity (like or dislike, positive or negative).

(Makmun, 2009, p.40)

"Educational product quality consisting of the following three criteria: validity, practicality and effectiveness." (Nieveen, 2007: 120). Nieveen states that an education product is said to be good if it has aspects of quality, among others: (1) Validity, (2) Practicality and (3) Effectiveness, so the developed device will be called a good tool if it meets all three criteria.

RESEARCH METHODS

Types of research

This type of research is a development research using 4D Thiagarajan model, which consists of several stages: define, design, develop and disseminate. The defining stage (define) consists of the final preliminary analysis, student analysis, concept analysis, task analysis and the formulation of learning objectives. Design stage consists of material preparation, media selection, format selection and initial design. Development phase consists of validation of experts and developmental testing. The place of study was conducted at SMPN 1 Srono located in Banyuwangi district.

Research Subject

Based on the suggestion of one of the mathematics teachers, finally the researcher chose one class that used as

research class. The class consists of 29 students so that in this study using 29 subjects consisting of grade VII students who have heterogeneous ability

Research Procedure

The procedure in this study begins with the preparation phase of doing field study to SMPN 1 Srono school in Banyuwangi to obtain data about the curriculum used, then look for data about students' potentials and problems about learning mathematics, after that make learning instrument with educational game media based on study field and potential student data problems and further validate the learning instrument developed. From the validation results are used as a material to improve learning instrument and then get the data. After the data is taken, the next step is to analyze the data and prepare the research report.

Data, Instruments, and Data Collection Techniques

The research instrument used in this research is motivation questionnaire, motivation questionnaire validation sheet, self-assessment sheet, self-assessment validation sheet, test result sheet, validation sheet of learning result test, media validation sheet and validation sheet of lesson plan. Questionnaire motivation is used to measure the increase in student learning motivation before and after following the learning process using educational game media. The self-assessment sheet is a research instrument used to measure students' ability to use game media in learning. The test result sheet is used to know the completeness of student learning outcomes. Questionnaire motivation and self-examination sheet used in the form of check list which consists of statement favorable and unfavorable. Research instruments such as motivation questionnaire, self-assessment sheet and test result sheet were made by the researcher, so it is necessary to validate the research instrument to find out whether the instrument made by the researcher is valid

and according to its use as data collecting tool in this research.

Data Analysis Technique

Validity Analysis

The data of the research were analyzed using data analysis technique to determine the validity of the learning instrument developed and the research instrument used in the research. The activities undertaken to test the validity are to create a table, then the data is further processed, then look for the average of each criterion from the validator assessment according to Khabibah (2006)

$$K_i = \frac{\sum_{h=1}^n Vh_i}{n}$$

K_i = i-criteria average

Vh_i = score of h-

validator to i-kriteria

n = number of validator

After we get the average value of each criterion, then searched the average value of each aspect by using the formula:

$$A_i = \frac{\sum_{j=1}^n K_{ij}}{n}$$

$A_i K_{ij}$ = i-aspect average to i-

criteria

K_{ij} = i-criteria average

n = number of criteria in i-

aspect

The final step before determining the criterion of the validity is to find the average total validity of all aspects, the formula used is

$$RTV = \frac{\sum_{j=1}^n A_i}{n}$$

RTV = validity average

A_i = i-aspect average

n = number of aspect

After we get the average total validity of all aspects, then determines the category of validity and by matching the total averages with the criteria

- $4 \leq RTV \leq 5$: Very valid
- $3 \leq RTV < 4$: Valid
- $2 \leq RTV < 3$: less valid
- $1 \leq RTV < 2$: invalid

(adapted Khabibah,

2006)

Practicality Analysis

Learning instrument developed in this study are said to be practical if each validator states that the instrument can be used with little revision or without revision, and the ability of students in using media including categories capable or very capable. The formula used to determine students' level of ability is

$$SK = \frac{\text{total point}}{\text{maximum point}} \times 100\%$$

SK = Student ability score

Setelah didapat skor kemampuan siswa , selanjutnya menentukan kriteria kemampuan siwa

$85\% \leq SK$ = very capable

$70\% \leq SK < 85\%$ = capable

$50\% \leq SK < 70\%$ = less capble

$SK < 50\%$ = incapable

(adapted from Khabibah,

2006)

Effectiveness Analysis

The developed instrument is said to be effective if the learning outcomes of students get a classical completeness where $\geq 75\%$ of students get the final value based on the criteria of completeness according to the curriculum 2013 and $\geq 75\%$ of the number of students who become subjects increased motivation that can be seen from the motivation questionnaire score before and after follow the lesson.

RESEARCH RESULT AND DISCUSSION

The results of this study is a description of the steps of learning instrument development with educational game media by adapting the 4D development model.

Definition Stage (Define)

Preliminary Analysis (front-end analysis)

The first step of the research is to interview one of the math teachers at SMP 1 Srono and get some information and data as follows:

- a. SMPN 1 Srono since last 4 years using curriculum 2013.
- b. Lessons made in the classroom are less varied.
- c. Never used learning activities using game media in class VII.2,
- d. Exercise by students in general in the form of activities to do the questions contained in the BSE package books and sometimes the problem is made individually by the teacher.
- e. The transformation material is one of the VII class material that has not been taught by the teacher before the research takes place.

Student Analysis (learner analysis)

Based on observations prior to the study, students in grades VII.2 still within the range of an average age of 13-14 years, seemed to really like the game and are excited and curious when it was announced to the students that will do a study using educational games. Students who become research subjects have varying cognitive abilities and motivation levels.

Concept analysis

Based on the review of curriculum in 2013 for the junior class VII, there are several sub-material in the chapter transformation. In this research use sub reflection material.

Task analysis

The tasks that will be given by students in the form of a series of activities in the game that must be done students. Activities that will be done by the students in the form of finding the coordinates of a point which is the result of reflecting a point on the line. Another activity is students looking for the original coordinates of a point after being reflected on a line.

Formulating instructional objectives

Learning objectives to be achieved is by using educational games as a medium to train students' ability to solve problems

related to the concept of reflection, students can determine the coordinates of a point which is the result of reflection to a line

Stage of Planning (Design)

Preparation of materials

In KD 3.9 the concept of transformation (dilation, translation, reflection, rotation) is selected. The material chosen in this lesson is the transformation material of the reflecting sub material, which is the reflection of a point on the line axis.

Selection of media.

The type of media to be developed is the educational game media in the form of print media consisting of cards and boards. The educational game media was chosen in this study because the play is the pleasure of every age group of one of them from the age group of 13-15 years (junior high school students of class VII) so that it can help the students improve the learning motivation and their ability to solve problems related to reflection. The media type chosen in this research is graphic media, where according to Sundayana (2014: 17) there are advantages of using graphic media in general that is easy to get, so that every student in every place can use the media.

Selection of formats for media, RPP, motivation questionnaire, self-assessment sheet, and learning result test.

Educational game media that will be developed consists of two kinds of components of cards and boards. The card format is one side there is a description of the type of card and on the other side there is the contents of the card. Card and board formats are selected and made as clear and attractive as possible, thus increasing the students' motivation to learn.

The RPP format developed in this study is tailored to the rules contained in the 2013 curriculum.

The format used in the motivation questionnaire and the self-assessment sheet are four main sections, namely the identity of the questionnaire, a brief description of the purpose given by the questionnaire, the questionnaire rules and the columns with multiple statements.

Format on Test Results Learning Sheet there are three main parts namely; Student identity, brief instructions on general filling instructions and some questions about reflection.

Then made an initial design of learning instrument developed form of lesson plan and media game education. At this stage, the required research instruments and their validation sheets, such as motivation questionnaires, motivation questionnaire validation sheets, self-assessment sheets, self-assessment validation sheets, test result sheets and test result validation sheets in draft form 1 before the experiment was conducted.

Development Stage

Validation by experts. In this validation phase was performed by three validators of each developed instrument and research instrument (self-assessment sheet, test result sheet and Motivation Questionnaire) made by the researcher.

The validation result I in the media shows the average validation value of 3.8 (valid), the two validators stated that the media can be used with a little revision and one of the validator states can be used with many revisions. The result of validation II to the media shows the average validation value 3.9 (valid), the three validators stated that the media can be used with a little revision.

The result of validation I in lesson plan shows a valid validation value of 3.8 (valid), two validators assert that RPP can be used with little revision and one of the validator states can be used with many revisions. The second validation result against the lesson plan shows the average validation value 4 (very valid), the three

validators state that the lesson plan can be used with little revision.

The validation result on the motivation questionnaire shows the average validation value of 3.92 (valid), both validators stated that the motivation questionnaire can be used with little revision and one of the validator states can be used without revision.

The validation results on the self-assessment sheet show the average validation value of 3.72 (valid), both validators state that the self-assessment sheet can be used with little revision and one of the validator states can be used without revision.

The validation results on the test result sheet show the average validation value of 4.22 (very valid), both validators stated that the test result sheet can be used with little revision and one of the validator states can be used without revision.

Tests on the subject of research aims to obtain data on the completeness of student learning outcomes, increased student learning motivation and the ability of students using the media in learning. After the students are given the test result of learning at the end of the learning then the results get 25 students get the complete value and only 4 students are not complete. Then it can be concluded that has been obtained classical completeness where $\geq 75\%$ of students get the final value

After the calculation of the questionnaire score of students' learning motivation before and after following the learning then obtained 23 students have increased, 4 students have decreased, 2 students have stagnant. From the number of students who have increased, it can be concluded that has gained $\geq 75\%$ of students experiencing learning motivation have increased.

Based on the score of self-assessment sheet, students' ability in using game media in learning shows that 8 students can be categorized as very capable, 16 students are capable, 4 students are less capable and 1 student is very less

able. Then it can be concluded that $\geq 75\%$ of students are categorized as capable or very capable.

CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis of data obtained during the development stage, it can be concluded as follows

Valid

The developed lesson plan has an average total validity of 4 (very valid) whereas the developed education game has an average total validity of 3.8 (valid) so it can be concluded that the learning instrument developed in this study can be categorized as valid instrument.

Practical

Learning instrument developed in this study can be categorized as practical instrument, because the average general assessment validator states that lesson plan and education game can be used with a little revision, and based on the questionnaire score the students' response states that the ability of $\geq 75\%$ of students is categorized as capable or highly capable

Effective

Learning instrument developed in this study can be categorized as an effective instrument, because after following the process of learning in the class as much as $\geq 75\%$ of students get the complete value, as much as 79.3% of students have increased motivation questionnaire score which $\geq 75\%$ of students experiencing learning motivation have increased.

As for his suggestions as follows

1. During the process of the testing phase of the subject, the members of each group consist of 4-5 students. We recommend that when doing the game the number of students in a group consists of 2-3 students, so that each student will be active without anyone who rely on the explanation of friends in one group.
2. The dice used in the game of Arect education should be two, because

the number of plots that pass is 40 so that one group can pass or stop at the finish line before the math ends.

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