

Fraction Triangle Cards (FTC) game as learning media for multiplying fractions in fifth grade elementary school

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Abstract

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Learning media can help in improving the students' skills, so they can achieve the learning objectives effectively. This research is a development research that aims to create learning media which is feasible and valid. This research uses concrete objects in the form of cards for multiplying fraction materials in grade 5 Public Primary School of Tambakaji 04 Semarang. The research was conducted by using Sugiyono's development method. The techniques of data collection conducted in this study were (1) questionnaire, to evaluate the media validity, obtained through validation by the validators; (2) test, to measure the media effectiveness obtained through students' learning outcomes. The results show that the average score of media validity is 90%, and media effectiveness from students' learning outcomes is 0.4. Therefore, this learning media is effective and feasible so that it can be used in multiplying fractions learning in fifth grade of elementary school.

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1. Introduction

Education should be properly implemented and in a good quality. Quality education is education which can develop students' potential, skills, and knowledge. Mathematics is one of the subjects learned in each level of education. It shows that mathematics is an important subject for life. To encourage students' abilities in learning mathematics, students are taught by using various learning sources and media which can help improving students' abilities in logical, creative, and systematic thinking.

The use of learning sources and media can be varied in any form which aims to improve students' abilities to understand the concept or to develop students' skills. Media is very high supporting factor for the teaching and learning process, as explained by Munir, et al (2016) that media directly involve children and play a substantial role to justify their intellectual curiosity. Media can support learning to be more effective.

The media in learning can help achieve the following goals: (1) attracting and sustaining attention, (2) developing interest, (3) adjusting the

learning climate and (4) promotes acceptance (Seth, Owusu K 2009). Students' learning process and learning outcomes show a significant difference of learning without learning media from learning with media. Learning media is highly recommended to improve the quality of education.

The selection of media which is appropriate with students' characteristics will be more helpful in achieving the success of learning process. One of the learning media functions is facilitating students to have skills that students are supposed to have. Therefore, by using learning media, students have skills in accordance with the learning objectives which positively affect the learning outcomes.

In this study, the researchers investigated the initial condition of grade 5 Public Primary School of Tambakaji 04 Semarang, that in mathematics learning, the teachers did not use any learning media for fraction materials. The researchers also obtained the data on mathematics learning outcomes that there were many students who still did not achieve minimum learning mastery. In learning fraction for elementary school students shows that relates learning materials to the students' experience will be an increase in students' understanding and learning is not just a

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memory or memorization that resulted in students will not quickly forget (Ginting 2017)

The solution for the above problems is by creating innovation, one of which is by using interesting learning media that can develop students' skills. An effort to improve the quality of mathematics learning for multiplying fraction materials is FTC (Fraction Triangle Cards) Game. The game in learning process should be design with various activities to create the game experience for students (Setyaningrum et al 2018).

FTC (Fraction Triangle Cards) game is the development of domi numbers learning media which aims to improve students' skills and learning outcomes. This game is a game of concrete object with cards as the main media. According to Pitadjeng (2015), domi numbers can be used to help arithmetic skills of students in grade 1 to grade 6 of elementary schools. The game design is adapted to the abilities that students are supposed to have. Furthermore Yurniwati (2017) said that "The purpose of learning mathematics in elementary school is the students understand the concept of mathematics, using logic, make generalizations, problem solving and communicating ideas and have the attitude of appreciate the usefulness of mathematics in life"

FTC (Fraction Triangle Card) game contains multiplying fraction materials which is the problem in mathematics learning in grade 5 Public Primary School of Tambakaji 04 Semarang. The game is played in groups, and each of them consists of heterogeneous students, so the skilled students can help their friends who still have difficulties in multiplying fractions. By using FTC (Fraction Triangle Cards), it is supposed that students' learning outcomes is improved.

2. Methods

The type of research employed in this study was development research with quantitative approach. The method used the research and development steps by Sugiyono (2015): (1) Potential and problems. In this case, potential and problems should be shown by empirical data. (2) Collecting information. In this step, information which can be used as the object of planning particular product to solve the problem was collected. (3) Product design. The product in this study was various. In education aspect, the products were supposed to improve productivity in education. (4)Design validation. This step was an activity process to measure whether the product would be more

effective or not. Product validation could be done by presenting some experienced experts. (5)Design improvement. After validated by some experts, the weaknesses could be identified. The weaknesses were then improved by improving the design by the researchers. (6) Product trial. The trial was done with the aim to find out whether the product is feasibly and effectively used in learning. (7)Product revision. After product trials, information about the product weaknesses was obtained. In this step, the weaknesses could be improved and continued to the next trial. (8)Implementation trial. After product trial, the information about product feasibility and effectiveness was obtained, and there might be slight revision. (9)Product revision. This step was the final revision step if the implementation in a wider range had weaknesses. (10) Creating mass production. The researchers did not conduct this step due to the cost and time constraint.

This study aims to develop learning media in the form of FTC (Fraction Triangle Cards) game for multiplying fraction materials in grade 5 of elementary school which is feasible and valid. The trial was conducted for students in grade 5A Public Primary School of Tambakaji 04 Semarang.

3. Results & Discussions

The research which is conducted by using Sugiyono's research and development method obtains the result as follows:

3.1. Potential and Problems

This step serves as a basis for developing the required learning media. Several activities conducted in this step are problem identification and analysis of students' needs.

The analysis of learning in grade 5 is about the students' difficulties and potential. After identifying that students have difficulties in doing fraction questions, the researchers focus this study on multiplying fractions as it is the basis for continuing to the next materials, dividing fractions. Killi (2018) explained that considering the difficulties that children and even the adult have, for rational number, traditional teaching method should be reconsidered and equipped with new instruments to enhance the knowledge of numbers.

To train students to improve their learning outcomes on multiplying fractions, it is needed the development of multiplying fraction cards game or called as FTC (Fraction Triangle Cards) which adopts domi numbers game since the

characteristics of five graders are still in the age of play and can understand the game’s rules. Chiu (2016) stated that “students could master mathematical concepts after learning and achieve actual learning through playing”. Kaune (2013) explained that mathematics game encourages students to practice metacognitive and discursive activities and to provide mathematical reasoning, this activity enhances students’ mathematical performance.

Besides analysis of potential and problem, analysis of curriculum is also conducted to observe mathematics learning materials in grade 5 which is developed in the learning media.

3.2. Collecting Information

In this step, the researchers collect information which is relevant to the development of learning media product which is by distributing questionnaires of needs analysis to the students and teachers which consist of questions about the developed game. From this step, the description to create card game is obtained.

3.3. Product Design

After gaining information from the analysis of teacher and students’ needs, the product is created in the form of cards game with triangle shape which contains questions and answers on each card. Below is the design of FTC (Fraction Triangle Cards) game.

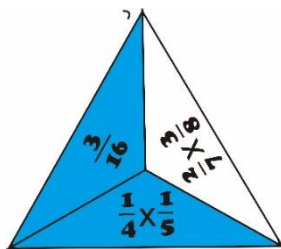


Figure 1. Triangle card contain of questions and answer

Even there are many difficulties for students in fractions. Example some students declare the numerator or denominator separately, not as the value of the fraction (Hansen, 2015). Through this triangle card it is expected these difficulties can be reduced, because of the FTC representation. If the card is completed based on the rule, it will create a pattern as follows.

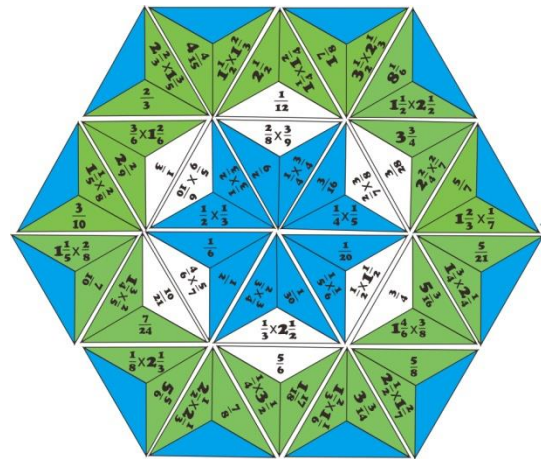


Figure 2. Completed Fraction Triangle Cards (FTC)

3.4. Design Validation

In this validation step, the product of FTC (Fraction Triangle Cards) is evaluated by two experts in the materials and media aspects. The validation result of FTC (Fraction Triangle Card) game development as the learning media for multiplying fractions is as follows.

Table 1. Feasibility Evaluation of FTC (Fraction Triangle Cards) Game

| No | Parameter | Media Expert | Materials Expert |
|----|----------------|---------------|------------------|
| 1 | Obtained score | 33 | 26 |
| 2 | Maximum score | 36 | 28 |
| 3 | Percentage | 92.8 | 91.7 |
| 4 | Criteria | Very feasible | Very feasible |

Besides evaluating in quantitative score, the validators also add suggestion to improve the materials in FTC (Fraction Triangle Cards) media in the suggestion column, which is please brighten the green and blue colour of FTC (Fraction Triangle Cards) media background so that the colour is not too dark, revision is needed in the use of colour and font type used in FTC media, lesson plan revision: adjust with the learning model used. Based on the above analysis of evaluation by the two experts, FTC (Fraction Triangle Cards) game is valid and can be used in the next step which is product trial.

3.5. Product Trial

Product trial aims to evaluate product validity, the evaluation can be used as the improvement for the next step. The trial is conducted in a small group consisting of 31 students in grade 5.



Figure 3. The grade 5 students of Public Primary School Tambakaji 04 play the FTC game

To investigate the media effectiveness, normality test, correlation t test, z test and n gain calculation are conducted. Below is the detail of the calculation.

Table 2. Students' Learning Outcomes

| Data | Implementation Trials | |
|-------------------------------------|---|-----------|
| Number of students | Pre-test | Post-test |
| Higher Score | 95 | 100 |
| Lowest Score | 0 | 15 |
| Mean | 61.13 | 79.35 |
| Σ Students who master | 15 | 28 |
| Σ Students who do not master | 16 | 3 |
| Learning mastery test | Zvalue > Ztable 1,987 > 1.64 (Classical mastery is more than 75%) | |
| t-test | tvalue > ttable 1.697 > -4.74 (Significant, there is an effect) | |
| n-gain | 0.47 (medium category) | |

3.6. Products Revision and Mass Production

After conducting product trials in a small group, the researchers obtain feedback and product evaluation by the teacher of grade 5, the teacher suggests that FTC (Fraction Triangle Cards) game have rules which are put in the card place so that the rules are not separated from the card. In the final product revision, the researchers do small improvement in the rules of FTC (Fraction Triangle Cards) game.

In the mass production step, the researchers make mass production of FTC (Fraction Triangle Cards) for Public Primary School of Tambakaji 4 Semarang.

4. Conclusion

This research is a development research which creates learning media in the form of FTC (Fraction Triangle Cards) game. Based on the research which has been conducted, it is concluded that FTC (Fraction Triangle Cards) game is developed by adapting the existing domi numbers card game. Creating this game design is by considering the problems, potential, needs, and characteristics of FTC (Fraction Triangle Cards) game. The product developed is in the form of cards, how to make it, and the game rules. FTC (Fraction Triangle Cards) game is designed to train students' skills in multiplying fractions.

Based on the validity test of FTC (Fraction Triangle Cards) game as learning media which has been done by two validators with some revision and improvement, it can be said that the learning media for multiplying fractions is valid. In addition, the effectiveness trial with students' score, FTC (Fraction Triangle Cards) learning media is effectively applied in multiplying fractions learning in fifth grade elementary school

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