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Development of Student's Mission Learning Media on The Addition and Subtraction of Integer

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Abstract: The success of the students in learning addition and subtraction of integer can be influenced by some factors, one of them is how the teacher delivering those materials. One of joyful learning in teaching addition and subtraction of integer is by using educational games. This research purpose is to develop a valid and practical learning media, which is called educational game "Student's Mission for the fourth graders of junior high school in addition and subtraction of integer. The development model of tis research is adapted from Plomp Model that has four stages: (1) needs analysis, (2) designing stage, (3) realization stage, and (4) test, evaluation, and revision. Based on the data analysis, it was obtained that the learning media which is developed is valid and practical.

Keywords: learning media, Student's Mission, addition and subtraction

INTRODUCTION

Mathematics is a science that must be studied continuously. Therefore mathematics is in elementary school to high school curriculum (Permendikbud, 2014). Besides having to be studied continuously, mathematics is also a science that is arranged hierarchically, that is, between one material and another in mathematics, they are interrelated. Therefore, students' success in learning one material will affect the next material.

The addition and subtraction of integers is a material that was taught in fourth grade. This material is important to be learned because this material relate to another subject (Kemendikbud, 2013). But in reality, the students still have difficulties in learning this material. Based on interviews with fourth-grade teachers, the students still have difficulty adding and subtracting, especially that involving negative integers. Most of the students can answer the question correctly at the beginning but when it is given in the next meeting, most of the students forget the concept that has been taught. The teacher said it is possibly caused by the lack of understanding concepts and enrichment provided. Another thing that causes students to have difficulty in learning addition and subtraction of integer, is the lack of student interest in mathematics and the assumption that mathematics is a boring and difficult lesson. It makes the students not being too serious in learning mathematics and finally they face difficulties of solving mathematics problems.

Success in learning the addition and subtraction of numbers can be caused by some factors, one of them is the way the teacher teaches/delivering the material. Currently, a lot of learning is still teacher-centered, so students tend to be less interested in mathematics (Adriani & Harianto, 2010; Neumann, 2014). Therefore, teachers need to make more efforts to attract students' attention in learning mathematics. One of the solutions is make the

students actively involved in the activity of using concrete or semi-concrete objects and objects in learning addition and subtraction of integers, in this case learning media are that can attract students' attention such as doing educational games that can help learning and enhance the student's learning experiences (Huyen & Nga; Poon, 2013).

Educational games are very enjoyable activities and can be one of educational methods or tools (David, 2012). While Pujiadi (2012) states that educational games are games that have educational content. Another opinion from Viorika (2019) about an educational game, which is a game used in the learning process and in the game contains elements that educate or values education. From the description, it can be concluded that educational games are games that are used in the learning process and these games contain educational elements or educational values. Educational games in mathematics that have been widely developed, such as monopoly mathematics.

Based on the description above, it is necessary to develop interactive learning media in the form of educational games that can attract students' interest in studying the addition and subtraction of integers. Educational games can be in the form of games to complete certain missions related to mathematics problems and carried out in groups. That missions in educational games can be in the form of questions in addition and subtraction of integers. The educational game that will be developed consists of 3 missions with different levels of questions for each mission and the missions must be done sequentially. This new educational game is then called the Student's Mission

METHOD

The development of students' mission learning media is included in development research and it refers to the Plomp development model. This plomp development model consists of 5 steps, namely 1) initial investigation stage, 2) design stage, 3) realization stage, 4) evaluation, test, and revision stage, and 5) implementation stage (Hobri, 2010). However, this research was only carried out to the stage of testing, evaluation, and revision due to the limitations of the researcher.

In this development research, 2 tests will be carried out to determine the quality of the product, namely the validity test and practicality test. A validity test was conducted to test the suitability of product development with development theory. While the practicality test is carried out to determine the applicability of the learning media produced in the learning process, this includes whether the media is easy and enjoyable to be used in learning.

The validity test was carried out using a learning media validation sheet. The validation sheet is filled out by 2 experienced mathematics lecturers. The practicality test was carried out using observation sheets and student response questionnaires to the learning media. The observation sheet is filled out by 1 observer while the student response questionnaire is filled out by 20 fourth-grade students as test subjects.

The techniques of data analysis for validity and practicality tests includes, 1) recapitulating assessment data of the product into a table that includes aspects, indicators, and values for each validator, 2) determining the average value of the assessment results from all validators for each indicator, and 3) determining the validation score or practicality score, namely the total average value of the average scores for all indicators (Hobri, 2010).

Furthermore, the results of data analysis for validity and practicality tests will be compared with the criteria for validity and practicality as shown in table 1.

Table 1. Criteria for Validity and Practicality of Learning Media

Score Interval	Criteria	Description
$3,75 \leq Va \leq 4$	very valid/ very practical	no revision
$3 \leq Va < 3,75$	valid/practical	no revision
$2,5 \leq Va < 3$	quite valid / quite practical	partial revision
$1,75 \leq Va < 2,5$	less valid / less practical	partial revision
$1 \leq Va < 1,75$	invalid/ impractical	total revision

RESULT AND DISCUSSION

The result of this development is the Student's Mission learning media which consists of 1 set of games boards and the rules of the games that are used for one meeting. A game board set consists of 1) 3 mission envelopes which are distributed in each mission, 2) questions related to addition and subtraction of integers written on colored paper placed in the mission envelope, 3) question and answer papers and 4) media to stick. While the rules of the game consist of several rules for carrying out the Student's Mission.

The data that are obtained from the validity test consist of the data from the validity test results of the Student's Mission learning media. The data analysis of the validity test results of the Student's Mission learning media by the validator is presented in Table 2.

Table 2. Data Analysis of Media Validity Test Results by Validators

No.	Assessed Aspects	Validity Score	Criteria Validity	Description
<i>Material</i>				
1.	The media used is in accordance with the subject matter	4	Valid	no revision
2.	The media used is in accordance with the learning objectives	3,5	Valid	no revision
3.	The <u>clear of uses instructions</u>	3	Valid	no revision
<i>Quality Media</i>				
4.	<u>Media appearance is attractive</u>	4	Valid	no revision
5.	The ease of using media	3	Valid	no revision
<i>Attraction</i>				
6	The use of media can reduce students' dependence on teachers	3	Valid	no revision
7	The use of media can minimize misperceptions that occur in students	3,5	Valid	no revision
8	The use of media can motivate students in understanding the material.	4	Valid	no revision

Based on the explanation above, in general, the validity score of the Student's Mission learning media is 3,5 , so the learning media is valid based on the validation criterias and does not require revisions. However, revisions will still be done to make the product more perfect. Revisions that made by the developer are based on suggestions and comments from the validator to improve the developed Student's Mission learning media.

This following are some things that need to be revised in the developed Student's Mission learning media. In Figure 1 below, there is a snapshot of the game's rules on mission 1, mission 2, and mission 3.

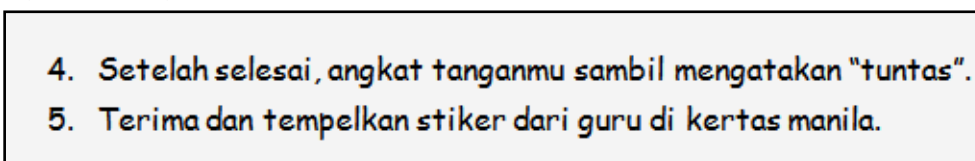
- 
4. Setelah selesai, angkat tanganmu sambil mengatakan "tuntas".
 5. Terima dan tempelkan stiker dari guru di kertas manila.

Figure 1. Game rules number 4 and 5 in mission 1, mission 2 and mission 3

Based on the suggestion from the validator, for the rules of the game, there should be a checking of the correctness of student work after completing the mission to obtain some "love stickers" and continue the next mission. This is intended so that the missions that are completed by students not only because students do it quickly, but also precisely. Of course it has an impact on providing the number of love stickers described in the general rule. As a result of the above correction, another situation that must be considered is if there is only one teacher in the class and must check the work of more than five groups. Therefore, based on suggestions from the validators, the developers revised the game rules, so the students are said to have completed the mission if the answer is correct, and to overcome the problem of the teacher having difficulty checking all groups, based on suggestions from the validator, the developer will add the answer key given. after completing the mission but after 2 checks the answer is not quite right. The following is a revised result of the game rules number 4 and 5 in mission 1, mission 2, and mission 3 shown in figure 2.

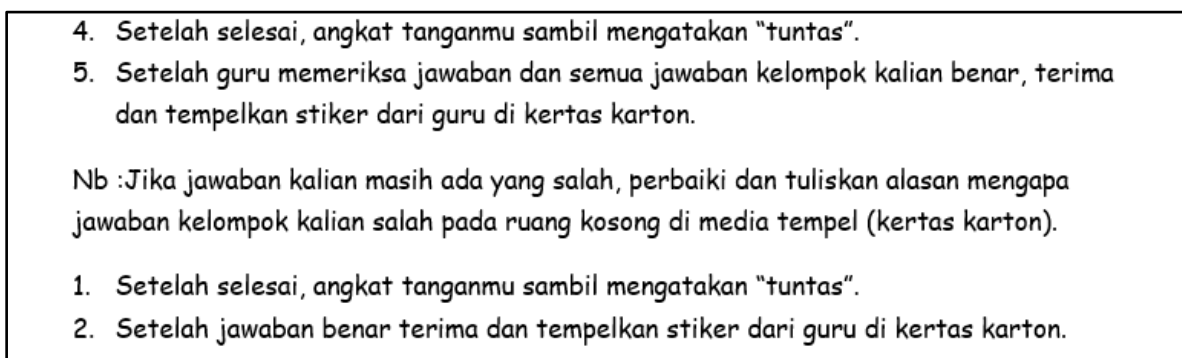
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4. Setelah selesai, angkat tanganmu sambil mengatakan "tuntas".
 5. Setelah guru memeriksa jawaban dan semua jawaban kelompok kalian benar, terima dan tempelkan stiker dari guru di kertas karton.
- Nb :Jika jawaban kalian masih ada yang salah, perbaiki dan tuliskan alasan mengapa jawaban kelompok kalian salah pada ruang kosong di media tempel (kertas karton).
1. Setelah selesai, angkat tanganmu sambil mengatakan "tuntas".
 2. Setelah jawaban benar terima dan tempelkan stiker dari guru di kertas karton.

Figure 2. The results of the revised game rules number 4 and 5 on mission 1, mission 2 and mission 3.

Another revision to improve the Student's Mission learning media is in the work visit activity at the end of the game. Figure 3 below is a snapshot from the rules for visiting the work.

5. Setelah semua kelompok menyelesaikan semua misinya, semua kelompok wajib melakukan "kunjung karya", yaitu masing-masing kelompok wajib mengirimkan 2 anggota kelompoknya untuk mengunjungi karya yang berupa semua misi yang telah diselesaikan oleh kelompok lain.

Figure 3. Game rule number 5 in General Game Rules

Based on the validator's suggestion, the meaning of "kunjung karya" in the rules of the game is not clear enough. Therefore, based on suggestions from the developer validator, the developers revise the general rules of the game. The developer will write in more detail that the meaning of visiting in this game is to select and record each of the 2 questions and answers from each of the missions that have to be discussed with group Friends. The following revision results are shown in Figure 4

5. Setelah semua kelompok menyelesaikan semua misinya, semua kelompok wajib melakukan "kunjung karya", yaitu masing-masing kelompok wajib mengirimkan 2 anggota kelompoknya untuk mengunjungi karya yang berupa semua misi yang telah diselesaikan oleh kelompok lain. Anggota yang berkunjung wajib mencatat masing-masing 2 soal dan jawaban dari masing-masing misi yang ada dengan tujuan untuk didiskusikan dengan teman sekelompok.

Figure 4. The results of the revised game rules number 5 in the General Game Rules

The next revision for improving the Student's Mission learning media is on the clarity of instructions on how to paste question papers and answer papers. Figure 5 below shows examples of question papers and answer papers in question

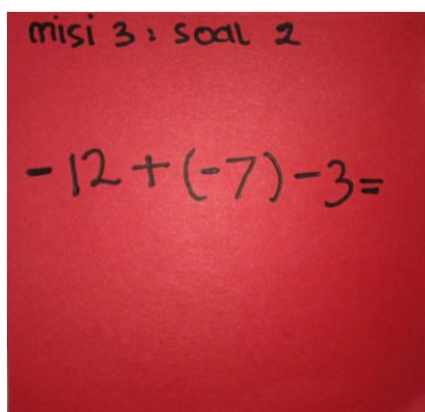




Figure 5. Question paper and answer paper Front/back view

The question and answer paper has been given through the mission envelope are intended to be pasted. From Figure 3, it can be seen that in the question paper and answer paper, double tips have been given to attach the mission board. The developer does not provide special rules for the layout or how to paste the question paper and answer paper. Therefore, based on suggestions from the validator, the developer revised to provide clarity on how to paste, namely by notifying that the paper can be directly pasted by opening the double tips on the back of the paper. The developer will also provide clarity on the layout of the attachment of the question and answer papers on the rules on each given mission envelope.

Table 3. Data Analysis of Practicality Test Results of Learning Media by Observers and Students of Test Subjects

No	Assessed Aspects	Practicality Score	Practicality Criteria	Description
1.	The teacher uses interesting media	3,86	Practical	no revision
2.	The media used in this lesson will be useful for me	3,19	Practical	no revision
3.	Using this media makes me understand the learning material	3,14	Quite Practical	partial revision
4.	The media used makes me bored studying.....??	4	Practical	no revision

The data on the practicality of the Student's Mission learning media were obtained through the results of filling out student response questionnaires to the Student's Mission learning media. Overall, the practicality score of the media developed was 3.54. This score indicates that the Student's Mission learning media developed is practical, so it does not require revision. However, the developer continues to make revisions based on suggestions and comments from the test subjects for the perfection of the developed Student's Mission learning media.

The first suggestion from the test subject regarding the color of the question paper and answer paper used, the developer will pay more attention to the selection and color match

between the question paper and certain answer paper, Figure 6 below shows the color comparison of the question paper and answer paper.

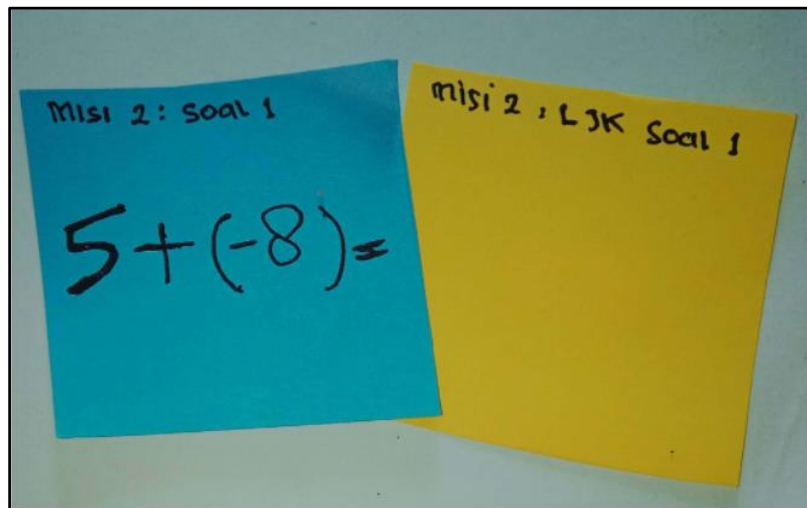


Figure 6. Color comparison between question paper and answer paper

In the Student's Mission learning media that was developed, the developer did not pay attention to (choose randomly) the color match between the paper and the answers. Therefore, the developer will make a matching color between the question paper and the answer paper.

Seeing the results of the practicality test analysis, the main thing that must be improved from the developed Student's Mission learning media is regarding the rules of the game. The rules need to be explained as clearly as possible because the rules of the game that are made are the main factor in the success of a game being carried out. Therefore, for the improvement the learning media, the developer will revise the rules of the game on the developed Student's Mission learning media.

CONCLUSION

The development of the Student's Mission learning media which consists of 1 set of board games and game rules used for one meeting uses a validity test and a practicality test as a benchmark to determine the quality of the product developed. In the data analysis carried out to test the validity by the validator, the Student's Mission learning media was declared valid with a validity score of 3,5. Thus, the Student's Mission learning media did not require revision, but the developer continued to make revisions for product perfection, where the revised part was in the determination of game rules. As for the practicality test of the Student's Mission learning media which was carried out through the test subject's response sheet, it was found that the Student's Mission learning media developed got a practicality score of 3,54 and was declared valid and did not need to be revised. However, the developer continues to make revisions for the perfection of the Student's Mission learning media.

Based on the description above, some suggestions for utilization and development related to the development of Student's Mission learning media are:

1. The results of the development in the form of Student's Mission learning media are expected to be used as an alternative learning material for fourth-grade junior high school students
2. The developments result are expected to be used as an example or consideration by elementary and high school teachers in developing learning media with the game method
3. Based on the development result, it is hoped that there will be a Student's Mission learning development for other appropriate materials and levels.
4. For other developers who are interested or interested in programming, product development with similar material can be developed into CAL (Computer Assisted Learning).

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