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USING MAKE A MATCH CARDS ABOUT CELL TO IMPROVE STUDENTS' LEARNING OUTCOME

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Abstract

The research aimed to describe the use of make a match cards about cell to improve student learning outcome in term of knowledge. The feasiblity of the make a match card was reviewed in terms of the validity, practicalty, and effectiveness aspects. The research design used in this study was Research and Development (R&D). The validity aspect is obtained through the validation process by 2 lecturers and 1 science teacher using a validation sheet based on a Likert Scale. The results showed that the validity of the make a match card obtained modus value of 4 with a decent category. The practicalty and effectiveness aspects are carried out through a product trial process involving 29 junior high school students of SMP Negeri 50 Surabaya in grade 7th. The practicality of the make a match card in terms of the student activity sheet obtained an average percentage of 94,30% with a very practical category. Response questionnaire in terms of the observation sheet of student responses showed that 96,55% of students gave positive responses to use of the make a match card on sub cell material. The effectiveness of the make a match card was reviewed in terms of improving student learning outcomes obtained based on the results of the pretest and posttest that gained an average 0,61 0f N-Gain score with medium category. Based on the validity, particality, and effectiveness aspects, it can be concluded that the make a match card on sub cell material is appropriate to be utilized in learning.

Keywords: *Make a Match Cards, Cell, Learning Outcome.*

INTRODUCTIONS

Science can literally be referred to the study of nature and the events in it (Nisbah, 2013). Science relates with how to find out about nature systematically, so science is not only mastering collection of knowledge in the form of facts, concepts or principles, but science is also a process of discovery (Kumiawati, 2014). Some concepts in science are abstract. Abstract concepts are phenomena that are too small, large, fast or slow that cannot be observed directly by naked eyes, so that they need tools to be observed (Barab, 2007). Abstract concepts in science include the atoms concept of Rudiyanto (2016), the concept of the digestive system (Farah, 2017), and the concept of cells (Azizah, 2011). According to Rudiyanto (2016), students have difficulty mastering the concept of atoms because atoms are very small. Farah (2007) in her research revealed that students had difficulty mastering the concept of digestive system because students could not directly see the process. While Azizah (2011) states that students have difficulty mastering the cell concept because cells are real objects but are microscopic.

Facts about the difficulties students have in learingn about abstract science concepts are also supported by the results of a pre-research interview with two science teachers at SMPN 50 Surabaya. According to the two teachers, the concept that is considered difficult in learning science is the life organization system, especially the sub material cell. It is because the sub material is still abstract in students' minds. In addition, students are lazy to read and memorize the terms in sub cell material. At the time of learning sub cell material the teacher has tried to explain the material using media such as power points, worksheets accompanied by discussion methods, questions and answers, but the desired learning outcomes have not been reached to the fullest. As a result, more than 60% of students still have not reached the mastery of learning that has been set at school that is equal to 70. This is in accordance with the results of a survey at SMPN 50 Surabaya through a pre-research questionnaire which showed 88% of students stated that the material for the organization of living systems was not easy.

Based on the results of the national exams for SMP / MTs students in the study of the Educator Assessment Center by the Ministry of Education and

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Culture, it can be seen the achievement of student learning outcomes from the results of the National Science Examination which has been carried out annually. Average National Achievement of Science subjects for the 2016/2017 Academic Year; 2017/2018, 2018/2019 were respectively obtained by 52.36%; 48.05%; and 48.79%. Based on the data of the National Science Examination results for three consecutive years, it can be concluded that the learning outcomes of Natural Sciences need to be improved more, since some concepts in sciences are abstract. As the result, the desired learning outcomes have not been achieved optimally.

One solution to overcome the difficulties of abstract concepts is the use of visualization media (Murtiningrum, Ashadi, and Sri, 2013). Learning using visual media will make it easier for students to understand the subject matter. Sanjaya (2008) states that visual media is media that can only be seen, does not contain sound elements. Visual based media play an important role in the learning process, especially for abstract concepts. Sakti (2013) in his research revealed that visualization can clarify student observations and contribute to improving student understanding.

Learning media play an important role in the learning process. The use of media in learning can facilitate understanding and strengthen memory. In addition, learning media can provide a relationship between the content of subject matter with the real world (Priatmoko, 2012). In addition, the use of learning media will generate new desires and interests, as well as generate motivation and stimulation when learning and will have a positive influence (Sudjana, 2009).

The use of learning media is considered very necessary in learning to facilitate the delivery of concepts and materials to students to be able to master them. Learning media is a useful tool in teaching and learning activities in the classroom. Learning media is appropriate to be utilized in learning at SMPN 50 Surabaya. This is in accordance with the results of a survey which states that 83% of students agree with the use of media in science because with the media learning, science will be fun.

One of the visual media that can be used on sub cell material is a Make a Match card. Make a Match card is a media consisting of question cards and answer cards that can channel messages from teacher to students, by means of students collaborating with other students in finding answer cards held by their partners (Amri, 2013).

According to Huda (2013), learning to use the Make a Match card has several advantages including: fun because there are elements of play, increasing student motivation, increasing student learning activities, and increasing student curiosity. Based on research conducted by Chonstantika, et al (2013), the Make a Match card can enhance cooperation between students, so that it can be used in solving problems that occur. Aprilia (2016), Pertiwi (2015), Prasetyaningrum (2016), Febrina (2011) agree that learning using *Make a Match* cards can improve student activity and learning outcomes.

Based on the above background, the authors conducted a study entitled "Development of Make a Match Card Media on Cell Sub Material to Improve Student Learning Outcomes" in terms of validity, practicality, and effectiveness of the make a match card.

METHOD

This research is a type of research development with the method of research and development (R&D) which consists of six stages, namely determination of potential and problems, information gathering, product design, validation, revision, and product trials (Sugiyono, 2013). The research development plan is illustrated in the following diagram:

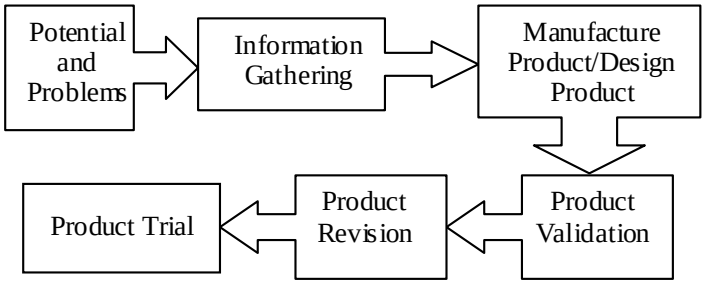

Figure 1. Chart of Steps - Development Steps for Research and Development (R&D) Models
Source: Sugiyono, 2013

The trial design of this study was one group pretest-posttest design. The make a match card media was tested on 29 students of class VII-E at SMP Negeri 50 Surabaya. Data collection methods used in this study include; questionnaire method in the form of a study sheet, validation sheet, and student response questionnaire, a test method in the form of a pretest and posttest sheet and an observation method in the form of a student activity sheet.

The validity of the make a match card media was analyzed using the study sheet and validation sheet. A make a match card media review was conducted to obtain suggestions for improvement from the reviewers. Furthermore, the revised make a match card media according to the advice and input provided by the examining lecturers, were assessed by 3 validators namely 2 science lecturers and 1 science teacher at SMP Negeri 50 Surabaya.

The practicality of the make a match card media is viewed from two aspects, namely based on the observations of student activities when using the make a match card media and the results of student questionnaire responses. And for effectiveness in terms of improving student learning outcomes.

RESULTS AND DISCUSSION

1. Validity

The validity of the make a match card media was obtained based on the results of the validation of three validators consisting of 2 science lecturers and 1 science teacher at SMP Negeri 50 Surabaya. Before validation, the make a match card media is reviewed by the reviewers to get suggestions for improvement from the reviewers. The results of a make a match card media review are suggestions for improving the cover design, introduction, adding a bibliography, and the

suitability of the questions on the make a match card media.

The make a match card media that has been revised in accordance with the advice and input provided by the examiner lecturer, then the validation stage is conducted which is assessed by three validators. The results of the assessment given by the validator are used to determine the suitability of the make a match based on content criteria, linguistic criteria, presentation criteria, and game function criteria before being tested on students. Based on the results of the validation, the make a match card media needs to be revised according to input and suggestions from the validator, including the game manual, and items on the make a match card media.

The results of the assessment by the validator are presented in graphical form as in Figure 2 below.

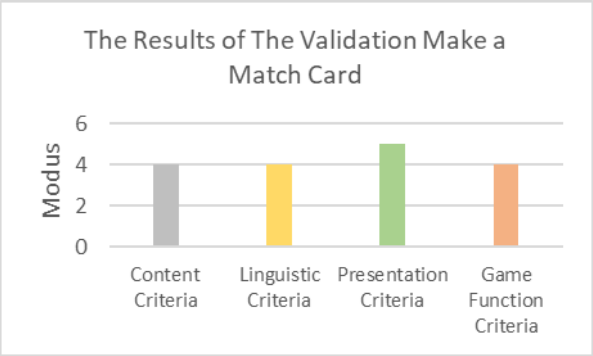

Figure 2. The Results of The Validation Make a Match

The make a match card media is deemed feasible if it reaches mode $\geqslant 4$ with decent assessment criteria (Riduwan, 2013). Based on Figure 2 it can be seen that the validation of the make a match card media is reviewed in terms of 4 criteria namely content criteria, linguistic criteria, presentation criteria, and game function criteria.

a. Content Criteria

Content criteria is assessed based on 3 aspects including clarity of purpose, clarity of rules, and clarity of diving activities. Clarity of purpose in playing is very important. According to McGonigal (2011) in Hidayat (2018) goals or results can be obtained from his activities in playing. A goal that is part of the design of a game will make students have a sense of purpose. In addition to the clarity of objectives in play, clarity of regulation is equally important.

Rules are restrictions on how the player can achieve his goals in the game. According to McGonigal (2011) in Hidayat (2018) there are rules that encourage players to explore various possible ways to realize their goals. Therefore, the rules in the game basically will stimulate the creativity and strategic thinking of players.

Correspondingly, Sadiman, et al (2012) stated that there are four main components in the game, namely the presence of players, the environment in which players interact, the rules of the game, and the objectives to be achieved.

b. Linguistic Criteria

The linguistic criteria on make a match is assessed based on 3 aspects, including the accuracy of writing scientific or foreign names, the use of simple, communicative, concise, and clear language, and the use of appropriate terms with the concept of material. This is in line with Setyawan's research (2019) which states that the linguistic aspect consists of clarity and ease of sentence arrangement, as well as the use of sentences in accordance with the material. This is also in accordance with the Depdiknas (2004) which states that good teaching materials have clear and understandable sentence structures, use language that is appropriate to the level of student development, and do not lead to multiple interpretations.

The accuracy and clarity of language use in learning media should be noted again. According to the Pusdiklat (2016) there are several criteria that must be considered in choosing learning media, one of which is the target of students. Target students focused on this research are students of SMP Negeri 50 Surabaya, so that the simplicity or clarity of a sentence is needed so that junior high school students can receive or understand the message to be conveyed by a teacher.

c. Presentation Criteria

The clarity of the images and the clarity of the shape of the letters on the make a match card media is calculated to attract the attention of students. This is in line with the benefits of learning media according to Arsyad (2011) in Mulyadi (2015) learning media can increase and direct children's attention so that it can lead to learning motivation. Colored, moving media elements are very helpful in attracting students' attention.

In addition to pay attention to the clarity of the images and the clarity of the shape of the letters on the make a match card media, the ease of carrying media and the durability of the make a match card media must also be considered. This is supported by research conducted by Khairunnisak (2015) which states that card media has several other advantages; easy to carry (practical), easy to serve, easy to make, and easy to store because of its size which does not require a large place. The statement is also in accordance with one of the technical requirements for making media in terms of Latif, et al (2013), among others; durability (strong and durable), durability (still effective despite changing weather).

d. Game Function Criteria

The assessment of the criteria for the game function includes three aspects, namely the media aspect of the make a match card, allowing for active participation from students where this aspect gets a mode score of 5 with a very decent category. This is in accordance with the statement of Ikayani

(2017) which states that the benefits and functions of learning media are to provide the same stimulation, prioritize experiences and give rise to the same perceptions of students. In line with the opinion of Latif, et al (2013), the media created should be able to foster student creativity, can be played so as to add fun for children, bring up imagination and can be objects of experimentation and exploration of children.

The next aspect is the use of the make a match card as a media stabilization material that gets a mode value of 4 with a decent category. The statement is in accordance with the opinion of Zaini (2008) in Pertiwi (2015) learning with a make a match card is quite enjoyable learning that is used to repeat the material that has been given previously (as stabilization).

The last aspect is the rules for using media make a match card can train sportsmanship with a mode value of 4 which is categorized as feasible. According to Sadiman, et al (2012) the strength of the game is that it can be challenging because in it there is an element of competence that can cause tension because the winner is unpredictable. Therefore, the media must be designed with rules in such a way as to be able to practice sportsmanship in students.

Based on the 4 criteria above, it can be concluded that the make a match card media qualifies as a learning media.

2. Practicality

Practicality aims to find out the ease of use of the make a match media during learning activities. The practicality aspect in make a match card media was assessed based on observations of student activities and student responses questionnaire. The following is a discussion of these two aspects:

a. Student Activity Observation

Observation of student activities during learning using the make a match card media was carried out during 2 meetings. The following are observations of student activities while using the make a match media card.

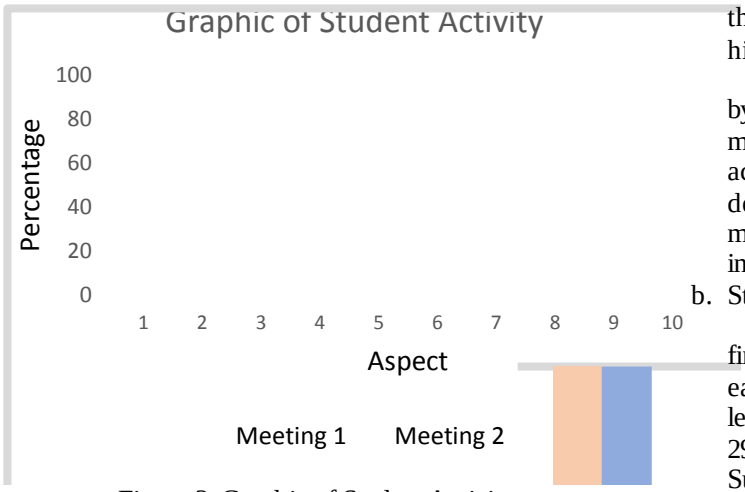

Figure 3. Graphic of Student Activity

Information :

1. Listen and pay attention to the teacher's explanation.
2. Read the game guide book.
3. Carry out the steps of the game in accordance with the game manual.
4. Read the question card to the opposing group.
5. Looking for answer cards and organelle picture cards based on questions that have been read.
6. Participate in group discussions to find answer cards and organelle cell picture cards.
7. Show the observer the answer card and cell organ picture card.
8. Orderly and sportsmanship during the game.
9. Do not criticize other groups if the answers given are not appropriate.
10. Do not do other activities during the game.

Student activities can be practical or very practical if the implementation of student activities using the make a match card media scored ⩾ 61% (Riduwan, 2013). Overall the media make a match card at the first meeting obtained a percentage of student activity of 93.10% with a very practical category and 95.52% with a very practical category for the second meeting (Riduwan, 2013).

The results of observing student activities during learning using the make a match card on cell sub material can optimize learning activities, because students are interested in the make a macth card media that has an attractive appearance and image. This is consistent with research conducted by Noviyanti, et al (2013) which states that student learning activities can be optimized by the use of picture card media because students are interested in picture card media that display pictures that make it easier for students to master concepts.

This is also supported by the results of research conducted by Yuniarti (2004) which shows that the use of picture cards can increase student learning activities during learning. Students become more attentive, bold in opinion, and active. According to Darsono et al. (2001) in Noviyanti, et al (2013) stated that student activity is one of the factors that influence student learning outcomes, the higher the student activity during learning, the higher the learning outcomes to be achieved.

This is also supported by research conducted by Huda (2013) which states that learning by using make a match media can increase student learning activities both cognitively and physically. From the description above, it can be concluded that the media card make a match on cell sub material can increase learning activities in students.

b. Student Response Questionnaire

Student response questionnaire was used to find out the responses from students regarding the ease of use of the make a match card media in learning. This response questionnaire was given to 29 students of class VII-E at SMP Negeri 50 Surabaya after playing a make a match card game.

Following are the data obtained based on student response questionnaire.

Figure 4. The Results of Student Questionnaire Responses to Make a Match Card

No	Questions	Percentage (%)		Criteria
		Yes	Not	
1	Does the make a match media card used in science learning on cell sub material make your learning atmosphere not boring?	100	0	Very Decent
2	Does learning while playing make you feel good?	100	0	Very Decent
3	Do you feel more active in learning with the make a match card media on cell sub material?	97	3	Very Decent
4	Can the images presented on the make a match card help you understand the material?	97	3	Very Decent
5	Is the language used in the make a match card easy to understand?	90	10	Very Decent
6	Does the media display of make a match card sub cell material good and attractive?	100	0	Very Decent
7	Does the media card make a match on cell sub material easy to operate / use?	100	0	Very Decent
8	Do you feel happy and satisfied after participating in the learning process using the media make a match?	100	0	Very Decent
9	Do you find it easier to learn science by using media cards make a match?	90	10	Very Decent
10	Are you interested if learning science in other material is taught using the media card make a match?	93	7	Very Decent
Average		96,7	3,3	Very Decent

The make a match card media is declared feasible if the score of student response results is 61% - 80% and is declared to be very feasible if the score of student response results is 81% - 100% (Riduwan, 2013). Based on Table 2, the mean percentage of students' positive responses to the make a match media card was 96.7%. According to Yuwono (2009) in Faryanti (2016) a person is said to give a positive response to the learning media because it is interesting.

The attractiveness of a media can make students feel motivated in learning. This is in accordance with the requirements of educational games where one of the conditions that must be present in a game that is used in learning is aesthetic requirements. This aesthetic requirement prioritizes the beauty of the game created because it can make students motivated (Zaman, 2011). Motivation is very important in the learning process. According to Sanjaya (2014) learning media can motivate students to learn. With the learning media will facilitate students in learning the material so that it can increase students passion for learning.

3. Effectiveness

The effectiveness of a media as a learning media can be seen based on the achievement of the desired learning goals. This is in accordance with the opinion of Sanjaya (2010) which states that the principle of using media to be used by teachers must be in accordance with learning objectives. The learning objectives that are focused by researchers are improving student learning outcomes that can be seen from the pretest and posttest scores in the following table.

Table 3. Recapitulation of Students Learning Outcomes Using the Make a Match Card Media on Cell Sub Material

Student Number	Pretest	Category	Posttest	Category	N Gain	Category
1	47	Not Complete	75	Complete	0,53	Medium
2	38	Not Complete	79	Complete	0,66	Medium
4	9	Not Complete	77	Complete	0,75	High
5	40	Not Complete	83	Complete	0,72	High
6	25	Not Complete	77	Complete	0,69	Medium
7	17	Not Complete	38	Not Complete	0,25	Low
8	23	Not Complete	83	Complete	0,78	High
9	21	Not Complete	87	Complete	0,84	High
10	28	Not Complete	74	Complete	0,64	Medium
11	19	Not Complete	70	Complete	0,63	Medium
13	49	Not Complete	72	Complete	0,45	Medium
14	34	Not Complete	74	Complete	0,61	Medium
15	28	Not Complete	72	Complete	0,61	Medium
16	19	Not Complete	72	Complete	0,65	Medium
18	36	Not Complete	45	Not Complete	0,14	Low

Student Number	Pretest	Category	Posttest	Category	N Gain	Category
19	21	Not Complete	81	Complete	0,76	High
20	30	Not Complete	77	Complete	0,67	Medium
21	25	Not Complete	74	Complete	0,65	Medium
23	21	Not Complete	72	Complete	0,65	Medium
24	40	Not Complete	87	Complete	0,78	High
25	26	Not Complete	34	Not Complete	0,11	Low
27	49	Not Complete	83	Complete	0,67	Medium
28	36	Not Complete	74	Complete	0,59	Medium
30	13	Not Complete	74	Complete	0,70	Medium
31	15	Not Complete	72	Complete	0,67	Medium
32	25	Not Complete	72	Complete	0,63	Medium
33	28	Not Complete	74	Complete	0,64	Medium
34	28	Not Complete	74	Complete	0,64	Medium
35	17	Not Complete	74	Complete	0,69	Medium
Average	28		72	Complete	0,61	Medium

Based on Table 3 it can be seen that there are no students who complete the results of the pretest. The value obtained by all students does not meet the Minimum Completeness Criteria (KKM) of the school which is 70. After using the make a match card media, and given a posttest, the value obtained by 26 students has fulfilled the KKM that is $\geqslant$ 70 and 3 students have not met the KKM.

The incompleteness of learning outcomes in the pretest and posttest scores can be caused by several factors, both internal and external factors. This is in line with the opinion of Susanto (2013) stating that learning outcomes achieved by students are the result of interactions between internal and external factors. Internal factors are factors within students that affect their learning abilities, including; intelligence, interest and attention, learning motivation, perseverance, attitude, study habits, and physical and health conditions. While external factors are factors that come from outside the student, including; family, school, and community.

The statement is also supported by the opinion of Slameto (2015) stating that the factors that influence student learning outcomes are the state of the school or the school environment. School environment is an environment where students learn systematically. These conditions include teaching methods, curriculum, teacher relations with students, student relations with students, school discipline, teaching tools, learning methods and other supporting facilities.

Increasing the value of each student can also be seen from the N-Gain score that is used to find out the increase in student learning outcomes before and after using the make a match card media. Based on Table 3 it can be seen that the average increase in student learning outcomes obtained by 0.61 in the medium category (Hake, 1999). This shows an increase in students understanding of the cell sub material after using the make a match card media with the category of moderate improvement. An increase in understanding with the moderate category indicates several things, one of which is the ability to absorb information by students differently. This statement is supported by research conducted by Anggraeni (2017) that each student has different abilities to absorb information and the level of stimulus to students during activities is less than the maximum. So that the expected increase in learning outcomes can not be achieved optimally.

Overall learning using the make a match card media can improve student learning outcomes. The statement is in accordance with research conducted by Yudasmara and Desi (2015) which states that the use of game media in the learning process can help teacher students deliver material so that students will more easily absorb material. According to Wulandari (2019) the use of instructional media by displaying images, videos, animations will be more interesting than the text, this will make students more interested in deepening the material being studied. This is reinforced by Dual Coding Theory by Paivio (1991) which states that information received by a person through sensing memory, in the form of verbal information and visual information, is processed differently through two existing codes, namely verbal and visual codes. These two codes organize information into knowledge that can be followed up, stored, and then released if needed.

The validity of the media used and supported by good teacher activities will increase student learning activities so students are motivated to learn and ultimately the learning outcomes obtained will also increase. Thus the make a match card media developed can be said to have been effective for improving student learning outcomes.

CONCLUSION

Based on the results of the study with the title development of a *make a match* card media on cell sub material to improve student learning outcomes of VII-E class at SMP Negeri 50 Surabaya, the following conclusions are obtained:

1. The validity of the media make a match card as a learning media consisting of aspects of the content criteria, linguistic criteria, presentation criteria, and game functions criteria that obtain an overall mode score of 4 with a category suitable for use.
2. The practicality of make a match card media in terms of the average activity of students during learning using a make a match card of 94.30% with a very practical category. In addition, the practicality of the make a match media card was also viewed from the results of student responses questionnaire. Student responses questionnaire showed 96.55% of students

gave a positive response to the use of the make a match card media on cell sub material.
3. The effectiveness of the make a match card media in terms of improving student learning outcomes through the pretest and posttest scores that have been obtained. From the pretest and posttest scores the average N-Gain score was 0.61 with the medium category.
4. The make a match card media is effectively used in learning sub cell material based on aspects of validity, practicality, and effectiveness.

SUGGESTION

Based on research that has been done regarding the development of a make a match card media on cell sub material, there are a number of suggestions that can be used for further research as follows:

1. The make a match learning media that has been developed is expected to be used as a learning media in learning activities.
2. We recommend that when learning to use the make a match card there needs to be an adequate allocation of time, so that the learning process can take place more effectively and the objectives of learning can be achieved optimally.
3. Further research should be done in the use of make a match card media on other sub material, such as sub material tissue, or organs.

THANK-YOU NOTE/RECOGNITION

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