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Utilization of Smart Whiteboard Media Based on Educational Games to Train Students' Creative Thinking Skills

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Abstract

This study aims to develop educational games that use smart whiteboard media, and related devices such as Learning Implementation Plans (RPP), Student Worksheets, and Creative Thinking Test Sheets that are appropriate to be used to practice creative thinking skills of fourth-grade elementary school students. This study uses a 4D development model (define, design, develop, and disseminate), which is limited to the third stage (develop). The use of game-based smart whiteboard media and related devices was then validated by experts and the results obtained that the media was valid and could be used in research. The study was conducted on 24 fourth-grade students of MI Miftahul Ulum with One Group Pretest-Posttest Design. The data collection instrument used was a media validation sheet filled out by three experts, a lesson plan implementation observation sheet, a student activity observation sheet, a creative thinking skills test sheet, and a student response questionnaire sheet. Methods of data analysis were carried out in the form of the media validation analysis, analysis of the implementation of learning activities, analysis of student activities, analysis of creative thinking skills, and analysis of student responses. The results of the research and research discussions can be concluded that the use of smart whiteboard media based on educational games to train students' creative thinking skills that have been developed is valid, practical, and effective.

Keywords: smart whiteboard, educational games, creative thinking skills

INTRODUCTION

The world continues to experience changes and developments in various aspects, this is the impact of the industrial revolution. The industrial revolution itself has taken place four times, starting from the industrial revolution 1.0 to 4.0 and touching all fields, one of which is the field of education (Trisyanti, 2018).

Along with developments that occur in education, the skills that need to be developed also continue to adjust. Biaik and Fadel (2015) state that the focus of expertise in the 21st century includes three things, namely knowledge, which includes traditional and modern knowledge; second, character, which includes attention, curiosity, courage, resilience, ethics, and leadership; and third, skills consisting of creativity, critical thinking, communication, and collaboration. Of these skills, it is stated that one them is creativity or creative thinking, which is the focus of this research. In-Law Number 20 of 2003 Article 4 Paragraph 4 it is stated that education is carried out by setting an example, building willingness, and developing students'

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creativity in learning. This shows that creativity or creative thinking skills is one of the important abilities for students to have.

Creative things are always considered to be related to something artistic, such as art and music. Whereas these abilities lead to an integral part of ability with a wider range (Biaik and Fadel, 2015). Creative thinking skills can be developed continuously. According to De Bono (2007), Asmin (2005), and Slameto (2003), to find various possible answers to a problem, students' creative thinking skills are important to be trained through learning so that students can access and process available information. One of the contents of lessons that can help students in practicing creative thinking skills is the content of science lessons. Science is defined as knowledge that studies natural phenomena. The purpose of learning science is not only so that students can master facts, concepts, and principles about nature, but also to train in problem-solving, draw conclusions, and familiarize students to be objective, as well as train their thinking skills (Samatowa, 2010).

The results of research conducted by Hanifah et al (2019) showed that the creative thinking skills of elementary school students were still not optimal. Some students are still not responsive in doing assignments from the teacher, their ability to express new ideas is still not expressed, and their participation in discussion activities is also not optimal. The same thing was also found in the research of Roy et al (2013) which revealed that when students enter school they often experience a decrease in their creative thinking ability. Among the causes are none other than cultural factors, such as pressure to adapt to their new environment. Teaching in the school system inadvertently hides students' creative skills because these skills are suppressed inside or outside the classroom through monotonous daily life and inviolable rules.

In essence, the teaching and learning process is a communication process, in which there is a messenger and a message recipient, so sometimes it works and sometimes it doesn't. Daryanto (2016) places learning media in a fairly important position as a component of the learning system. Without the media, communication will not occur and the learning process as a communication process will also not be able to take place optimally. According to Fanny (2013), it takes beautiful, interesting, and interactive media in learning so that students can be motivated and easy to accept the material presented. In line with this, De Porter and Haernacky (in Aziz, 2018) believe that a comfortable and pleasant learning atmosphere makes the teaching and learning process run effectively so that it has an impact on providing opportunities for students to express and display their creative potential. In this study, interesting learning media

and fun learning activities are presented in the use of smart whiteboard media in collaboration with games that have been developed to help students practice their creative thinking skills.

Türel et al (2012) describe the use of smart whiteboards that have been heavily invested in various countries. In 2010, its use was 73% in the UK, 50% in Denmark, and 35% in the United States. Meanwhile, in a study conducted by Gregorcic et al (2018), the use of smart whiteboards is not uncommon in England with a percentage of 93%, while in Turkey it reaches 80%, as well as in Denmark and the Netherlands with a percentage of use of 70%. , as well as more than 50% in classrooms in Australia and the United States.

The use of smart whiteboard media in this study refers to the first published findings of Johnny Chung Lee regarding the use of smart boards by utilizing a combination of motion sensor technology, infrared pen/stylus pen, and LCD projector. Now the smart whiteboard has come in a more efficient form and is easy to find in various marketplaces in the form of a camera with a connecting cable, which makes it easier for students and teachers to operate it. Supporting applications are also needed in its operation to maximize its use.

Meanwhile, educational games are a very fun activity and can be an educational method or tool (Ismail, 2006). Playing is one of the closest ways for students to understand something and encourage their curiosity (Ardini & Lestariningrum, 2018). One of the benefits that students feel from playing educational games is that it can stimulate and improve thinking skills, one of which is creative thinking (Hijrianti, 2017). According to Singer (Ardini & Lestariningrum, 2018), playing activities can be used by children or students to explore their world, develop competence, and develop their creativity. Mulyadi (2004) also relates playing activities that these activities have a special systematic relationship with something that is not playing, such as creativity, problem-solving, language learning, social development, and so on.

The educational game developed in this study carries the type of game based on the stages of play development that was coined by Jean Piaget. Because the research subjects are fourth-grade elementary school students, the theme of the game developed is Social Play Games with Rules which is intended for students with an age range of 8 to 11 years. Of course, the designed game activities are guided by the four pillars of creative thinking skills as stated by Nurlaela (2015), which include associating, questioning, observing, and experimenting.

Results of the design of an educational game developed using the PowerPoint application are shown in figures 3, 4, 5, and 6. The 1st game is a modification of one type of puzzle or puzzle according to Situmorang (2012), namely a spelling puzzle. Spelling puzzles

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are puzzles that consist of random letters to be matched into the correct vocabulary according to the questions or statements. This spelling puzzle is often called a word search puzzle.

Next is the second game, which is a modification of the letter(s) readiness puzzle type puzzle game. The letter(s) readiness puzzle is a type of puzzle in the form of pictures accompanied by the letters of the name of the picture but the letters are not complete. This game is also in development using the Social Play Games with Rules game, which is a game that in its implementation it is important to pay attention to the rules that have been made. Before being directed to the core of this word compiling game, students are invited to play the Spinning Wheel to choose the score they will get if they complete the puzzle. Based on the background, this study aims to develop smart whiteboard media based on educational games to train students' creative thinking skills.

METHOD

The method used in this article is development (R&D), which is research used to produce a particular product, and test its effectiveness. The development model that is used as a reference in this study is the Thiagarajan model. This Thiagarajan model is known as the 4-D Model which is carried out through 4 stages, namely defining, designing, developing, and disseminating (Thiagarajan, 1974: 6). The development carried out in this article leads to the domains of learning resources that include a variety of technologies used in learning. The product developed in this article is in the form of an educational game which is a modification of the spelling puzzle game and the letter(s) readiness puzzle based on the indicators of how to practice creative thinking skills according to Nurlaela (2019), namely associating, questioning, observing, and experimenting. In practice, the game developed will be displayed on the smart whiteboard. data collection instruments consist of media validation instruments, observation sheets on the implementation of learning plans, student activity observation sheets, student response questionnaire sheets, and creative thinking skills test sheets. The data analysis technique used is quantitative and qualitative analysis techniques.

RESULTS AND DISCUSSION

Results

Validation is carried out by three people who are experts in their fields, consisting of two lecturers and one teacher. The results of the validation of the use of smart whiteboard

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media based on educational games obtained an average score of 3-4 with a maximum scale of 4 and the percentage of agreement reached 86%. This means that the validator's assessment of the use of smart whiteboard media based on educational games is reliable and valid. This data the data is visualized in Figure 1.

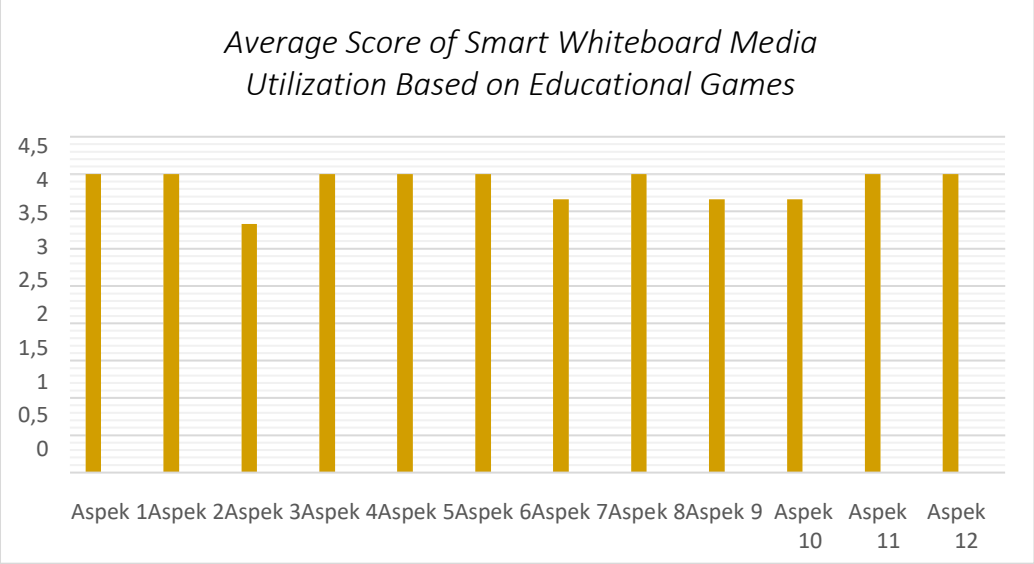

Figure 1. The results of the Media Validation

The results of the average score of RPP validation show that the developed RPP is valid with a percentage of agreement 86%. The last validity is on the creative thinking test questions that were developed. The test questions get a valid category with a 100% percentage of agreement. This data the data is visualized in Figure 2.

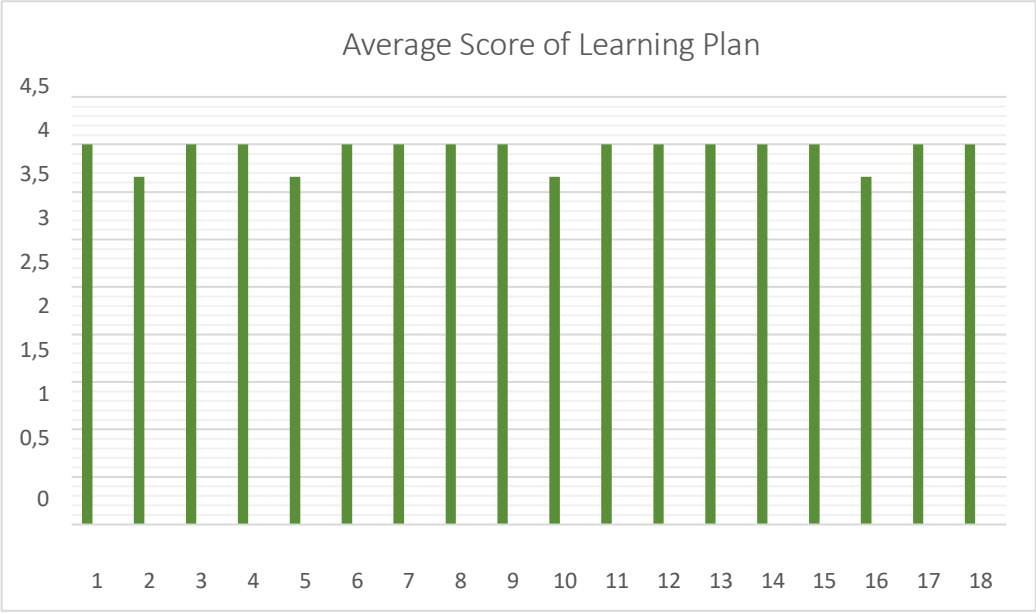

Figure 2. The results of the Learning Plan Validation

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Next is the result of practicality in terms of the implementation of learning carried out by teachers and students. Observations were carried out by two observers for 3 meetings. Observations of student activities were also carried out to determine the implementation of learning during research activities and during 3 meetings the percentage of implementation each obtained a percentage of 75%. This data the data is visualized in Figure 3.

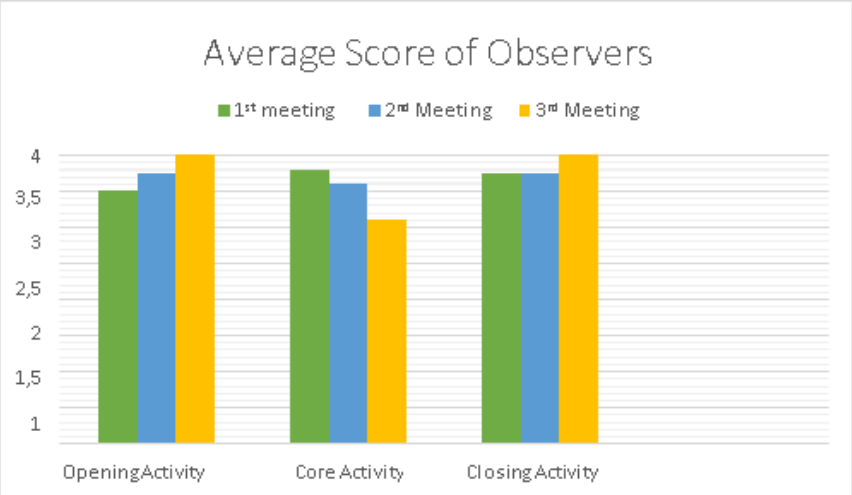

Figure 3. Average Score of Observers

The next result is the effectiveness in terms of the test results of creative thinking skills and student responses. The results of the students' pretest and posttest were tested for normality using the Shapiro-Wilk Normality Test, and the results are in Table 1. Based on the results of the normality test, it is known that the data is normally distributed so that an inferential test can then be performed using the Paired Sample T-Test. The results of the Paired Sample T-Test calculation show the significance value (2-tailed) is 0.001 which is <0.05.

Table 1. Result of Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.110	24	.200*	.950	24	.268
Posttest	.167	24	.082	.946	24	.223

Based on the output results above, it is known that the Shapiro-Wilk significance value (Sig.) for the pretest variable is 0.268 (Sig. > 0.05) so that the data is normally distributed. As for the significance value (Sig.) Shapiro-Wilk for the posttest variable is 0.223 (Sig. > 0.05) which is also normally distributed data. Furthermore, the data from the pretest and posttest which have been tested for normality and it is known that the data are normally distributed are

then tested inferentially using a paired sample t-test. The results of the paired two-sample t-test are shown in Table 2.

Table 2. Result of T-Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest - posttest	-34.917	6.691	1.366	-37.742	-32.091	-25.563	23	.001

Based on the output table 2, it is known that the significance value (2-tailed) is 0.001 which is <0.05. This indicates that there is a significant difference between the results of the pretest and the results of the posttest. The value of students after learning by using smart whiteboard media based on educational games to train students' creative thinking skills that have been developed by researchers is higher than when students do the pretest. These results indicate that there is an influence in the use of smart whiteboard media based on educational games that have been developed on students' creative thinking skills. Based on these results, it can be concluded that the use of smart whiteboard media based on educational games developed is effectively used in learning.

Discussion

The result of the discussion in this article is the use of smart whiteboard media based on educational games to train students' creative thinking skills and their supporting devices which include lesson plans, LKPD, and learning outcomes tests. The results of the feasibility are reviewed from the validity of the learning tools developed. The results of the validation of the use of media obtained an average score with a valid category of 11 out of 12 aspects of the assessment. The three validators agreed with each other in providing an assessment of the 12 aspects contained in the use of media with a percentage of agreement 86%, referring to Borich (1994).

The next component of supporting equipment to be validated is the lesson plan. The results of the validation obtained scores from the three validators ranging from 3-4 out of 4 assessment scores. Two of the three validators gave an assessment that the RPP developed could be used with revisions, while another validator assessed that the RPP could be used

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without revision. The percentage of agreement of the three validators in each aspect reached 86%. The Learning Implementation Plan (RPP) is the actualization of the student's learning experience that has previously been compiled in the learning syllabus. Based on this statement, the learning implementation plan can be interpreted as an explanation of the syllabus that is more functional and effective in the continuity of the learning process. As the name implies, the contents of the lesson plan are about the design of learning that will be carried out by teachers and students, in which there are also scenarios about what kind of learning will be carried out. Preparing RPP is an obligation for all educators in the education unit. The lesson plans must of course be prepared completely and systematically to achieve interactive, inspiring, fun, efficient, challenging learning activities, motivate students to participate actively, and provide sufficient space for the initiative, creativity, and independence according to their interests, talents, and abilities. physical and psychological development of students (Rachmawati & Daryanto, 2015)

The last component of the supporting tool that was validated was the developed creative thinking test. In this study, the creative thinking test developed was in the form of a description question that refers to the creative thinking indicators according to Filsaime (in Nurlaela, 2019), namely fluency, flexibility, originality, and elaboration. The results of the validity of the five items show that the creative thinking test questions developed are valid with a percentage of agreement reaching 100%.

The results of the validity of each component of the use of smart whiteboard media based on educational games and related supporting devices based on the discussion above can be concluded as valid and can be used in learning activities.

The criteria for using smart whiteboard media based on educational games can be said to be good, namely practicality. Practicality in this study is viewed from the implementation of the lesson plans by observing the activities of teachers and students. The teacher's activities in the three meetings showed the percentage of each implementation reached 75%, which means that it was implemented well. Learning activities are carried out when students and teachers are actively involved with learning resources that have been arranged in such a way by the teacher. In the interaction process, the teacher treats students as noble and honorable human beings, whose interests and abilities need to be optimally honed. Gagne recommends five assumptions that support learning planning; First, to facilitate the learning process by the characteristics of students, learning must be carefully designed. Although the learning process is carried out in groups based on the learning objectives, in essence, learning is still carried out

individually by students so it is very important to consider the condition of each student in planning learning. Second, in preparing the lesson plan, the teacher must take into account the short-term plan and the long-term plan. As a learning designer, the teacher must be closely related to the long-term plan. Third, the design of learning should be arranged systematically and systemically which allows for a person's growth and development. Fourth, learning should begin with a needs analysis, followed by the formulation of general learning objectives, and continue with learning steps. After that, look for empirical evidence regarding the efficacy of learning, trials, revisions, and so on to obtain learning standards. Fifth, learning must be developed based on knowledge of how a person or student learns (Karwono & Mularsih, 2019).

In observing student activities for three meetings, the percentage of each implementation reached 75%. This shows that students are actively involved during learning activities. Observations of student activities were carried out to assess the learning process by looking at the extent to which students were active in participating in the teaching and learning process. This observation of student activity is in line with the opinion of Sudjana (2013) who states that student activity in teaching and learning activities can be seen in: (1) participation in carrying out their learning tasks; (2) involvement in problem-solving; (3) ask other students or teachers if they do not understand the problems they are facing; (4) trying to find the information needed for problem-solving; (5) carry out group discussions according to the teacher's instructions; (6) assessing his ability from the results obtained; (7) train yourself in solving similar problems; (8) the opportunity to use or apply what is obtained in completing the task or problem it faces.

The third criterion of good media utilization is effectiveness, which is reviewed based on the results of the students' creative thinking skills test and students' positive responses. Based on the results of calculations using the SPSS application, the pretest and posttest scores of students were normally distributed which were then tested inferentially with a paired sample t-test and showed the results that the use of smart whiteboard media integrated with educational games was effective.

Student responses were obtained from filling out the student response questionnaire sheet given after the last lesson at meeting 3. This questionnaire sheet was filled out by 24 fourth-grade elementary school students. The results of student responses were obtained from an analysis of the number of students who answered positively "yes" to each question on the questionnaire sheet. Of 15 questions, the percentage of students' 'yes' answers reached 72%

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with a description of 13 questions in the positive category and 2 questions in the fairly positive category.

CONCLUSION

The results of the research and research discussions are then linked to the formulation of the problem and research objectives, it can be concluded that the use of game-based smart whiteboard media to train students' creative thinking skills that have been developed:

1. Valid, according to the assessment of the three validators in the 'good' category.
2. Practical, according to the assessment of the two observers seen from the implementation of the lesson plans and student activities during the three meetings.

Effective, seen from the significant difference between the results of the pretest and posttest tests of students' creative thinking skills and positive responses from students..

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