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Critical Thinking and Development: Interactive Multimedia as the Supporting Media of Critical Thinking Skill

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Abstract: This study aims to develop learning media using interactive multimedia on the material types of work to improve the critical thinking skills of grade IV primary school students. This type of research is a developmental study using the dick and carrey development model. The results of the feasibility test of interactive multimedia products are categorized as feasible because the results of media validation testing, materials, individual tests and small groups show very good categories. The practicality of the development of learning media is categorized very well because the scores of the results of the implementation of learning and classroom learning activity has a range between 3.5-4.0. The aspect of media effectiveness is tested using t-test, the result is obtained t_{table} value of 2.024 and t_{count} of 2.435, $t_{count} > t_{table}$ means that there is a significant difference critical thinking ability by using interactive multimedia in learning on the material types of work 4th grade students basic.

INTRODUCTION

Learning can lead to a movement of changes in students in a planned way, both in aspects of knowledge, skills or attitudes. Good learning is learning by providing learning materials that students can see. Learning is conveyed by embedding the concept and characteristics of essential values in the subject matter (Herijanto, 2012).

Learning can be said to succeed if the achievement of educational goals that have been formulated in the law of national education system. The low ability of teachers in managing materials, choosing media, methods and determining learning approaches leads to inadequate learning objectives. This makes learning less successful. The behavior of teachers who treat students only as objects in learning makes students passive, not creative and low student learning outcomes.

Each school can determine the curriculum to be applied. The curriculum is key in overcoming the obstacles that occur when supported by good learning media. Learning media is anything that can be used to channel or convey a message in order to stimulate student's thoughts, feelings, interests and concerns. Media can make abstract learning into concrete. The most media that can be used to improve student's learning interest is interactive multimedia.

Interactive multimedia uses clear, understandable language. Sound effects in interactive multimedia learning media can attract student's learning interests. Interactive process in the media can make students actively participate in learning, so that, learning activities become more competitive. Interactive multimedia can be used as a substitute and/or complementary medium that supports learning objectives, learning materials, learning methods

and assessment in the learning process in school (Rusman, 2015). Previous research on interactive media was done by Subarjono *et al*. His research developed an interactive CD media that can increase student's motivation by 4.37%. Resiani *et al*. (2015) also explains that the development of interactive multimedia can be very well received by learners with 93.6% individual test scores and small group 94.41% with very good criteria qualification. Initial observations conducted at school research found that teachers did not use any media during teaching. In the social studies lesson "types of work" it is known that many students still do not understand the relationship or the relationship between the talents of students, ideals and objects in everyday life with the types of work. For example: the teacher asks students to mention the types of work that match the objects that have been provided in front of the class. Most students still can not answer or confuse the types of work that match the objects in the classroom. Lots of students who have not achieved complete learning. Maximum student learning completeness is 75 but in social studies lesson "types of work" only 46% of students who achieve mastery learning while 11% of students have not reached mastery learning. This shows that the mastery of the material of the types of work is still not good. From the explanation and explanation of the points above problems, then conducted research on the development of interactive multimedia as a supportive critical thinking ability.

The formulation of the problem in this research is focused on the development of interactive multimedia in terms of, how is the feasibility of interactive multimedia development products in social studies lesson "types of work" as support of critical thinking ability? how is the practicality of interactive multimedia development product in social studies lesson "types of work" as support of critical thinking ability?: how is the effectiveness of interactive multimedia development products in social studies lesson "types of work" as supporting the ability of critical thinking?. The specific purpose of this research is to know the quality of multimedia interactive product development as the support of critical thinking ability. In general, the results of this study are expected to contribute as an effort to develop learning media that are interactive and interested students in learning.

Conceptual framework

Learning media: Media is an important factor in realizing the effectiveness of learning. Media is derived from the Latin "medium" which means "intermediary" which is the intermediary of the message source with the message receiver (Heinich *et al*., 1982). According to Mustaji, the media is a physical means that contains messages or means to convey messages.

Gerlach and Ely (1980) explains that the media are human, material or event that can build conditions that then make students able to acquire knowledge, skills or attitudes. In the process of learning held formally in school then the interaction that occurs during the learning process is influenced by the environment in this case such as teachers, textbooks and school environment can be regarded as media. The National Education Association in the United States defines media within the scope of education as anything that can be manipulated, seen, heard, read or discussed along with the instruments used for such activities. From some exposure of these experts can be concluded that the media is everything that can channel the message and can stimulate the thoughts, feelings and desires of students that can encourage the learning process. It can not be denied that a teacher is a bridge of knowledge for his students. Therefore, teachers need a medium to facilitate the course of learning. So, that, students more quickly understand the material to be delivered.

Leow and Neo (2014) describes the use of multimedia-based educational programs is getting more popular in many areas of learning and training as it stimulates the need for differentiation, reusability and individualization to fulfill the needs for different types of learners but not limited to conventional teaching and learning methods.

Interactive multimedia: Multimedia can present learning materials using words as well as pictures (Mayer, 2006). The multimedia component is characterized the presence of text, picture, sound, animation and video some or all of which are organized into some coherent program (Winarno *et al*., 2009). Multimedia components are text, images, sound, animation and video. Multimedia combines text, art, sound, animation and video delivered with computers or other electronic and digital manipulation equipment. Multimedia can be used to convey messages to the general public.

Interactive multimedia is a multimedia equipped with controller tools that can be operated by the user, so that, users can choose what is desired for the next process. Interactive is mutually influence between user/user and media/program (Ariani and Haryanto, 2010). Interactive multimedia presents video recording material with computer control to students. Students not only hear and view the video but can also provide an active response (Seels and Glasgow, 1990).

The advantages of using interactive multimedia: Interactive multimedia has a wide range of functions and benefits in education. First, the learning process is more interesting and more interactive. Second, the amount of teaching time can be reduced. Third, the quality of learners can be improved and the learning process can be done anywhere and anytime. Fourth, student's learning attitudes can be improved (Ariani and Haryanto, 2010). Interactive multimedia can be useful in developing cognitive basic attitudes and self-reflection in teachers while teaching in the classroom.

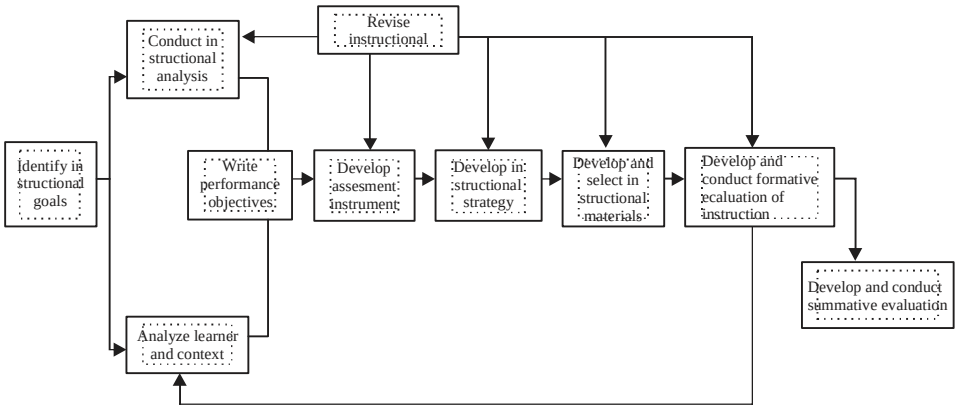

Fig. 1: Dick and carrey development design (2015)

A multimedia-based learning system to teach children with Intellectual Disabilities (ID) the basic living and science concepts is proposed. The tutorial's development is pedagogically based on Mayer's Cognitive Theory of Multimedia Learning combined with Skinner's Operating Conditioning Model. Both types of tutorials have been shown to improve their cognitive skills and become more proactive in the classroom.

Critical thinking: Thinking is a mental activity involving the workings of the brain. Although, it can not be separated from the work activities of the brain, the human mind is more than just the work of organs called the brain. Thinking activity also involves human feelings and will. To think of something is to direct oneself to a certain object, to be actively aware and to present it in the mind then to have an insight about the object (Ahmadi, 2003).

Critical thinking is thinking of systematically investigating (Bergerr and chaffe, 1989). Critical thinking can acquire relevant and reliable knowledge (Giancarlo and Facino, 2001). Critical thinking is thinking reasoning, reflective, responsible and adept at thinking. A person who thinks critically can determine the relevant information and can be exact to make a conclusion.

Critical thinking is focused on making decisions about what to believe or do. The definition implies five things, logical thinking by using good reasons; reflective thinking by consciously seeking and using good reasons; thinking focused, i.e., thinking for a particular purpose; decision making on matters to be trusted or believed by evaluating statements or deeds; trends and trends, namely cognitive ability and tendency to use these abilities (Nitko, 1996).

MATERIALS AND METHODS

Research design: This research is a media development research (Fig. 1). This development model uses the Dick and Carrey model (2015). Development of interactive multimedia is done with 10 stages namely, identify insteuctional goals, conduct instructional analysis, analyze learner and contexts, write performance objectives, develop assessment instrument, develop instructional strategy, develop and select instructional materials, design and conduct formative evaluation of instruction), revise instruction, design and conduct formative evaluation of instruction. The subjects of the study were grade 4 students of elementary school.

Data collection method: Data collection methods through validation sheets and student test sheets. The data were analyzed qualitatively then described in descriptive form. The study was conducted competently. The emerging phenomena are analyzed, interpreted and drawn conclusions.

The research instruments used to obtain the data are the validation of the interactive multimedia in the form of questionnaire is given to the competent experts in the field of learning media to assess the interactive multimedia products and competent experts to assess the material in interactive multimedia observation. Observation is conducted to determine the implementation of learning and student activities when using interactive multimedia. The test in this study is pretest and posttest. Pretest is a series of activities to measure student's understanding of the material before the start of learning. The tested subject is the material that will be taught by the teacher. Posttest is a series of activities to measure student's understanding after following the learning to know the extent to which the achievement of student's ability after learning something. After the learning ends, students are given the problem to be done individually.

RESULTS AND DISCUSSION

The results of this study consisted of 2 types of data, namely qualitative data and quantitative data. At the

development stage of learning media using interactive media is done by applying Dick and Carry development model using qualitative data. While quantitatively done using inference test statistics to identify differences before and after the development.

Interactive multimedia feasibility: Expert validation is conducted to determine the feasibility of interactive multimedia in improving student's critical thinking skills of grade 4 elementary school. The data obtained from the validator in the form of quantitative data obtained from the questionnaire given to each validator with comments and suggestions for improvement of interactive multimedia. Assessment on the questionnaire is as follows:

- Very unfeasible
- Not worth it
- Feasible
- Very feasible

The questionnaire given to the media expert has a total of 18 statements, each statement has the highest score worth 4. So, the maximum score is 18×4 = 72. From the questionnaire filled by Mr. Drs. Yoyok Yermiandhoko, M.Pd. As media experts got a score of 64, so that, the average total assessment of media validators is 89% with interactive multimedia descriptions feasible or usable.

In material validation, the questionnaire given to the material expert amounted to 7 statements that each statement has the highest score is worth 4, then the score obtained is 4×7 = 28. Questionnaire has been filled by Mrs. Putri Rachmadyanti, M.Pd. As a material expert, obtained a score of 23, so, the average total assessment of the material validator is 82% with interactive multimedia descriptions feasible or usable.

The feasibility of interactive multimedia is also done through initial testing in small groups. Research subjects in small groups of 9 students grade 4. Sample research taken at random. From the results of small group trials, the results obtained that the score of each indicator scored 3.68 with very good category. Percentage of interactive multimedia eligibility 92.2%. Then it can be concluded that interactive multimedia is suitable for use in learning in school.

Interactive multimedia effectiveness: The effectiveness of learning using interactive multimedia can be seen through the learning result of student's critical thinking ability the learning result of critical thinking ability of cognitive domain students before learning is obtained from pretest value and learning result of student's critical thinking ability after learning is obtained from posttest value. A total of 20 students who followed the pretest with minimum exhaustiveness criteria (KKM) 75 resulted 8 students complete and 12 students unfinished. Interactive multimedia is applied to teachers on learning. The result of the student's score changes. Experiment a total of 20 students who followed the posttest with minimum exhaustiveness criteria (KKM) 75 resulted 15 students complete and only 5 students are not complete.

Before the learning process begins, a pretest is performed to measure student's initial ability before the learning process takes place. In the experimental class for the significant level obtained the criterion $\chi^2_{count}<\chi^2_{table}$ or 5.452<9.488. Then the data comes from a normally distributed population. While the result of calculation of data pretest value test of normality of control class obtained by criterion $\chi^2_{count}<\chi^2_{table}$ or 6.898<9.488. Then the data comes from a normally distributed population.

Based on the calculation using significant test for pretest value in this study obtained t_{table} of 2.024 and t_{count} of 0.401. Thus, it can be concluded that t_{count} is smaller than t_{table} then H_0 is accepted, so H_a is rejected thus it can be concluded that there is no significant difference of critical thinking ability by using interactive multimedia in learning on material of type of work of 4th graders of elementary school.

The calculation using significant test for posttest value in this study obtained t_{table} of 2.024 and t_{count} of 2.435. So, it can be concluded that t_{count} is bigger than t_{table} then H_o is rejected, so, H_a is accepted, so, it can be concluded that there is significant difference of critical thinking ability by using interactive multimedia in learning on material of type of work of fourth grade student of elementary school.

Interactive multimedia feasibility to increase student critical thinking skill: The feasibility of interactive multimedia can be done by validating and providing a response questionnaire to students for individual testing and small group testing. Validation is in the form of media validation (interactive multimedia) and validation of material that is in the developed media. Before validated to experts, researchers first develop interactive multimedia on the material types of work along with learning tools. After developing the media then the validation of interactive multimedia and learning tools and research instruments. In this feasibility assessment is done by 2 validator is the validator 1 as a material expert and 2 as a media expert. After validation to the 2 validators, then conducted trials person and small group trials. In individual trials and small group trials are given a questionnaire of student responses to determine the feasibility of interactive multimedia on the social studies of the material of the types of work.

Interactive multimedia is said to be feasible if the elements in it are in accordance with the characteristics of interactive multimedia that has been set. The

characteristics of interactive multimedia learning is to have more than one convergent medium such as combining audio and visual elements, interactive in the sense of having the ability to accommodate user responses is independent in the sense of providing convenience and completeness of the contents in such a way that the user can use without guidance of others (Daryanto, 2011).

The developed interactive multimedia is appropriate with the content, language, image, audio and interactive process. These 5 components have been assessed by both validators. The results of the assessment of the validator stated that the interactive multimedia on the material types of work is feasible to use but with revisions.

Interactive multimedia on the material of this type of work is a medium in which presented material supported by animated images that can move, audio effects and there is interaction between the media with students. So, interactive multimedia is able to cultivate interest in learning and attractiveness of students to learn the material types of work.

This interactive multimedia formulates the types of work in everyday life, the types of jobs and goods/services produced, the functions of the types of work and the obligations of workers in the community. This interactive multimedia aims to improve student's critical thinking skills, so that, there are critical thinking indicators such as identifying problems, solving problems with relevant facts, summarizing the results of problem solving, gathering and considering important information and drawing conclusions.

Prior to product trials, interactive multimedia was first validated by both validators, material validators and media validators. After going through the validation stage and declared eligible to use then the interactive multimedia on the material of these types of work can be continued in the next stage of field testing.

Types of work interactive multimedia practicality to increase student critical thinking skill: The practicality of interactive multimedia material of these types of work is seen from teachers and students who are users of interactive multimedia. So, to know this practicality the role of teachers and students is very important. The researcher develops 2 instruments to see the practicality of interactive multimedia i.e., observation sheet of learning implementation and student activity observation sheet.

The implementation of interactive multimedia is in accordance with the implementation of the learning implementation plan. This observation sheet consists of 2 sheets of the observation sheet of the implementation of the learning in the experimental class and the observation sheet of the learning implementation in the control class. The observation sheet of the learning activity was observed by 2 observers, Jazilatur Rohma, S.Pd as observer of learning implementation in the experimental class (using interactive multimedia) and Novita Fatmalasari, S., Pd as observer of learning execution in the control class (without using interactive multimedia). The implementation of this lesson shows that the developed interactive multimedia is done well and is practically used in learning.

Interactive multimedia effectiveness to increase student critical thinking skill: The use of interactive multimedia one can only make the learning process more interesting and more interactive. So, it can cultivate interest in the curiosity of students to learn on social studies material types of work. The material and quizzes are packed in interactive multimedia is presented with reference to the training of student's critical thinking skills to be grown, the quiz presented in interactive multimedia also aims to improve student's critical thinking skills tailored to the critical thinking process, indicators of the process such critical thinking is to identify problems, solve problems with relevant facts, summarize the results of problem solving, collect and consider important information and make conclusions.

Before the test results are given to the study subjects, validation is still done to the experts and conducted empiri test. The test is done by using validity test, reliability, problem level, differentiation power test and the last one is t-test. Based on the calculation using significant test for pretest value in the research, it obtained t_{table} of 2.024 and t_{count} of 0.401. Or t_{count} is smaller than t_{table} then H_o accepted, so, H_a rejected it can be concluded that there is no significant difference critical thinking ability by using interactive multimedia in learning on social studies material kinds of work. While for the posttest value based on the calculation results using significant test in this study obtained t_{table} value of 2.024 and t_{count} of 2.435. Or t_{count} is $>t_{table}$ then H_o is rejected, so, H_a accepted, it can be concluded that there is a significant difference of critical thinking ability by using interactive multimedia on social studies material of types of work of 4th graders of elementary school.

CONCLUSION

The whole of the research that has been done is about the development of interactive multimedia on learning material types of work to improve the critical thinking skills of grade 4 elementary school. Based on the points put forward in the research objectives, the conclusion of this study is divided into 3 main points, that is about the feasibility, practicality and effectiveness of the multimedia interactive development product on the learning materials of the types of work. In terms of

eligibility, interactive multimedia development products on learning material types of work can be concluded feasible or usable this is based on the result of expert validation assessment of 85% and the average total assessment of media and material validation of 3.40.

From the aspect of product development of interactive multimedia on learning material of work type can be seen from result of learning activity and student learning activity. For the results of experimental learning class execution obtained average score of 3.63 with very good category. While the control class obtained an average score of 3.63 with very good category. Furthermore, for the experimental class learning activity results obtained average score of 3.70 with very good category and the control class obtained an average score of 2.89 with good category. Based on these data it can be concluded that for the aspect of the practicality of multimedia interactive development products on learning materials types of work are categorized very well.

The effectiveness of learning using interactive multimedia can be seen through the learning of student's critical thinking skills in the experimental class. Significant test results (t-test) obtained t_{table} of 2.024 and t_{count} of 2.435. In other words that the value of t_{count} is $>t_{table}$ it can be concluded that there is no significant difference in critical thinking ability by using interactive multimedia in learning on the material types of work of fourth grade students of SDN Baturono. So, for the aspect of the effectiveness of multimedia interactive development products on learning materials types of work can be categorized very well.

Active interactive multimedia is used in the learning process is expected to be used by teachers in the learning process and can be an inspiration of making other learning media. Interactive multimedia is effectively used to improve student's critical thinking skills, it is suggested in their use adapted to the learning materials, so that, it can be effective.

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