Preliminary analysis of Problem Based Learning model implementation in the development of module assisted multimedia interactive game for improving critical thinking skill learners

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Preliminary analysis of Problem Based Learning model implementation in the development of module assisted multimedia interactive game for improving critical thinking skill learners

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Abstract. This preliminary research study aims to perform needs analysis in conducting research on the implementation of problem-based learning (PBL) model in the development of interactive multimedia module with game aid to improve critical thinking skill of students. Preliminary analyzes performed are preliminary analysis and analysis of learners. Initial analysis akhi include performance analysis, job analysis, SKL analysis and analysis of learning difficulties. While the analysis of learners consists of attitude analysis, knowledge analysis and skill analysis. The method used is descriptive method. The subjects of this research were physics teacher and students of class X State Senior High School 14 Padang. The type of data in this study is the primary data obtained through questionnaires that are qualitative. Data analysis technique performed in the form of scoring using Likert scale. The final preliminary analysis results, for the analysis of the results obtained 82% included in either category, job analysis 83% including good category, analysis SKL 70% included in both categories, and on analysis of learning difficulties 65% and included in good category. The result of the analysis of the students obtained attitude analysis 85%, included in good category, knowledge analysis 58% with enough category and skill analysis 55% are in enough category.

1. Introduction

Education plays an important role in the intellectual life of the nation. With the quality of education is well expected future generations of Indonesia to become qualified and biased in the era of globalization. This is in accordance with the Law No. 20 of 2003 chapter 2 article 3 on the National Education System, explaining that the national education aims to develop the potential of learners to become human beings who believe and cautious to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. Education is held as a process of culture and empowerment of learners that lasts for life.

In order to achieve the goal of national education the government made various efforts. One such effort is the improvement of Education Unit Level curriculum (KTSP) into the curriculum of 2013. The objective of Curriculum 2013 is to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative, and effective and able to
contribute to life society, nation, state, and world civilization. The 2013 curriculum emphasizes the
development of the knowledge, skills, and attitudes of learners in a holistic (balanced) way, using a
scientific approach or a scientific approach in learning. Government Regulation No. 32 of 2013 on
National Education Standards Article 19, paragraph 1, the learning process should be organized
interactively, inspiration, fun, challenging, motivate learners to participate actively and provide
sufficient space for initiative, creativity, and independence according to the talent, interests, and
physical and psychological development of learners. To realize the Government Regulation a teacher
must be creative in using the learning model in order to realize the government regulation. Several
learning materials and learning model is developed to support the
government regulation[1].

Problem-based learning is a challenging learning based on experience and natural phenomena will
spur the learner to improve skills in problem solving and critical thinking. Indicators of problem-
solving ability [2] consist of: identifying problems and gathering relevant information for the problem,
determining the problem to be addressed, evaluating alternative solutions as well as sorting, making
decisions or taking actions based on predetermined criteria, consequences of decisions taken, apply
disconnected solutions and check results, and solve problems independently. Problem based learning
(PBL) is a learning model designed to get learners important knowledge, which make them proficient
in solving problems, and have their own learning models and have participatory skills in the team. The
process of learning using a systemic approach to solve problems or face the challenges that will be
required in everyday life [3]. On the other hand, in model problem learning learners not only master a
number of subject matters, but how participants learners can develop ideas and ideas through verbal
language, it is based that the ability to speak verbally is one of the ability to think critically and can
develop independence and confidence of learners [4].

In line with that, education is now implemented to preparing students to be able to work in the
world and work in society in the future in a contributive and productive way. To meet the above
expectations, teachers as the spearhead of educational success, would be able to create a conducive
atmosphere of learning, so that students' self potential can develop optimally. Teachers in general,
especially physics subjects have time to update the current Physics learning patterns, should be able to
plan physics learning as interesting as possible, by preparing interactive multimedia teaching materials
with the help of games, interesting physics learning will increase the motivation to learn learners.

Reality in the field shows that students of SMAN Padang city, have a low learning motivation,
because the limitations of teachers in combining the technology and learning materials into an
interesting logic game. The fact of how many students skip learning, sitting on the Internet playing
games, spending time studying in vain, on the grounds of boredom, uninteresting, as it is full of
mathematical formulas and difficult to understand because of the abstract. This lowers learning
motivation and adversely affects the critical thinking skills of learners.

Based on the results of observations conducted in class X SMAN 14 Padang obtained Critical
Thinking Skill data students as in Figure 1.

![Figure 1. Data Critical Results Thinking Skill Students SMAN 14 Padang](image)
Figure 1 the difference between the expectation of Ideal Critical Thinking Skills of students in SMAN 14 Padang shown on the blue bar graph is not in accordance with the reality of the field shown on the purple bar graph from the graph can be concluded that the Critical Thinking Skill of the students is still low.

The result of observation conducted in class X SMAN 14 Padang shows that all expectations of the Curriculum 2013 has not showed significant results. In the final analysis, the results obtained with the percentage of 82% for performance analysis that we can understand that teachers have prepared a very good learning with the 2013 curriculum. The 83% job analysis is in either category. For analysis of SKL obtained 70% results meet the criteria good. However, there are weaknesses in the analysis of work and SKL in three aspects is still not optimal when compared with other aspects of the first learner has not shown logical thinking, critical, creative in making decisions, the second is not optimal problem solving ability complex and the three students not fully able to engage and participate in the community. Based on the results of questionnaire analysis of students gained attitudes 85% in very good category, knowledge 58% in enough category and skill 55% in enough category.

There are several principles to provide learning motivation to learners one of which learners more master the results of learning if it involves many senses [5]. Therefore, learning by using multiple senses or more will provide benefits for learners, this is an opportunity for educators to develop and always optimize various alternative learning media that stimulate learners to learn using various senses. One way to vary the teaching materials with interactive multimedia.

Complete teaching materials compared to some other teaching materials are modules, where the module is a learning material that is designed systematically based on a particular curriculum and packed in the smallest learning unit and allows students to learn independently within a certain time, but in doing the evaluation / questions in the module learners also tends not motivated [6]. One way to provide motivation to learners by varying ICT-based teaching materials with the help of games packed in interactive multimedia module [7,8]. For that educators must be able to create and use a variety of learning media and in accordance with technological progress. The interactive multimedia module is a module developed and comes with some results from the software program so that the module becomes interactive. according to Multimedia aims to present information in a form that is fun, interesting, easy to understand, and clear [9].

In accordance with the explanations described in this study, the interactive multimedia module in this research is an interactive instructional material arranged in a computer-based form using adobe flash as the main display that contains text, image, sound, animation, video in accordance with the needs in conveying learning information as well as equipped with interactive buttons that enable learners to be mutually active.

Based on the above description, it is necessary to do a preliminary analysis of the implementation of problem based learning model in the development of interactive multimedia module with game aid to improve critical thinking skill of students.

2. Research Methods

Type of research conducted in the form of descriptive research. The descriptive research is a type of research that describes a variables, symptoms, or incidence as it is without providing a control of the treatment [6]. The research using a qualitative approach with the consideration that researchers want to see, review, and describe about what it is by understanding the meaning, social interaction, and feelings of someone based on the view of data sources non-researchers [8].

Type of data taken is data primary. The analytical data were obtained from the initial observation by distributing a questionnaire statement about the learning process. The data collection instrument is a tool chosen and used by the researcher in collecting data, so that the activity becomes systematic. There are several instruments used by researchers to collect data in this study is a questionnaire of the initial analysis and questionnaire analysis of learners that aims to obtain data about teacher responses and assessments of learners to the learning process.
Data analysis techniques for the early questionnaire and the analysis of learners using a likert scale that aims to determine the extent to which educators and learners accept or reject the statement given. The likert scale is a statement whose answer is a scale of approval or rejection of the statement or question given. The form of the statement is made in a positive form. The scale of respondents’ answers is qualitative in the form of Likert scale [11]. The terms convert for such statements, stated in Table 1.

| Score | Category           | % Achievement Indicator |
|-------|--------------------|-------------------------|
| 1     | Strongly Disagree (STS) | 0-25                    |
| 2     | Disagree (TS)      | 26-50                   |
| 3     | Agree (S)          | 51-75                   |
| 4     | Strongly Agree (SS) | 76-100                  |

Category of early preliminary analysis and analysis of the characteristics of learners obtained by calculating the scores obtained from each respondent. Scores of each respondent were obtained using the equation:

\[
\text{Value of achievement} = \frac{\text{obtained score}}{\text{maximum score}} \times 100\%
\]

Data analysis to assess the final preliminary analysis and the learner analysis of each indicator using the provisions in Table 2.

| Interval (%) | Category         |
|--------------|------------------|
| 0 - 20       | Not good         |
| 21 - 40      | Less good        |
| 41 - 60      | Pretty good      |
| 61 - 80      | Good             |
| 81 - 100     | Very good        |

3. Result and Discussion
3.1. Front end analysis
Specifically consist of performance analysis, needs analysis, job analysis, practical experience of difficulty Learners learn, and some new concepts are needed in the learning Details on each of the analysis results are described in Figure 2.

Figure 2. Analysis results Final Beginning in Development of Interactive Multimedia Module
Figure 2 final preliminary analysis results, obtained a score of 82% in very good category, Analysis Performance we can understand that the teacher has prepared the learning well in accordance with the curriculum 2013. But there are several aspects that need to be considered in the implementation of the 2013 curriculum that is the use of interactive learning, the use of active learning seeking, the use of multimedia-based learning, the use of varied learning media, and the use of critical learning in which the five aspects have not been applied optimally educators in physics learning. The 83% Employment Analysis in this excellent category means that the profile and characteristics of Learners can meet the world's work needs for the graduates produced. Analysis of SKL obtained score 70% meet the criteria well this means that the profile of graduates that will be produced has met the expectations of the Curriculum 2013 especially in terms of intellectual, emotional, spiritual, and character.

Some aspects need to be developed that learners have not shown logical thinking, critical, creative in making decisions, the ability to solve complex problems have not been trained and learners have not fully involved and participate in the community environment where the achievement of the criteria of these three aspects is still not optimal when compared to other aspects. Learning Difficulties Analysis obtained a score of 65% good category meaning that Learners still need new concepts needed to be done so that learning can be developed so as to minimize the difficulties and failures Learners as well as equip Learners with new things that can simplify the learning process, but still not meet the expected criteria.

Based on the analysis of the beginning of the final obtained a picture of the facts of physics learning where interest, attention, motivation and learning habits have not been fully realized in the learning of physics. While for external factors that affect learning difficulties learners such as teaching methods, learning media and learning resources (textbook) is not appropriate in overcoming the difficulties of learners so that the expectations of the 2013 curriculum has not been realized optimally in learning, for it needed a solution that can help learners in physics learning and can improve the competence of learners. competencies that must be trained and possessed by the learner that is the competence of knowledge in reasoning, solve problems and think critically. This can be achieved if learners are trained to use it so they can get used to using critical thinking skills. Critical thinking skills can be trained through instructional materials and appropriate learning models. The development of interactive multimedia module in physics learning using problem based learning model is expected to stimulate the growth of critical thinking skill in the students.

3.2. Student Analysis

Results Analysis of learners consisting of indicators of interest, attitudes, motivation learning, learning styles and early ability of students in general are included in either category as can be seen in Figure 3.

Figure 3. Results of Student Learner Analysis

Results of student questionnaire analysis on the visible that the attitude analysis of students is good but seen from the results of knowledge and skills analysis is still not optimal so that it can affect the competence of learners to the results of physics learning [12], in the formal stage students have been systematic and include complex processes. already able to predict various possibilities.
4. Conclusion

Preliminary analysis is needed to see the problem of implementation of existing learning in the field as the basis that will be needed in the development of interactive multimedia module. Preliminary analyzes undertaken are early-stage analysis including performance analysis, SKL analysis, analysis of learning difficulties and job analysis. While the analysis of learners consists of indicators of attitude, knowledge and skills. In the preliminary analysis in general the results of the analysis fall into either category. But in some aspects still included in the category enough, namely aspects of skills and aspects of teaching materials. Student analysis is generally included in either category, where students have an interest to study physics, a good attitude during physics learning, but not yet motivated to learn the modules used in learning. Learners are very happy if the learning using practicum and learning methods are accompanied by interesting videos or pictures.

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