Preliminary analysis development of interactive student worksheets using inquiry based learning model for 10th grade senior high school

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Abstract. Physics learning emphasizes the giving of direct experience to students to foster the ability to think critical, creative, innovative, collaborative, and communicative. However, students are still difficult to understand and find the concept of physics, because learning is not yet fully centered on students, the existing teaching materials in the form student worksheets of are not interactive and the learning model has not been implemented optimally. This study aims to conduct an initial analysis of interactive student worksheet using the inquiry based learning model. This research is a descriptive study carried out through direct observation at senior high school (SMA N 15 Padang) with a sample of research is students of grade 10th. The initial analysis of the development of interactive student worksheet includes analysis of students, analysis of teaching materials, media analysis, and analysis of learning activities with instruments in the form of questionnaires and interviews. Based on the analysis of the data from the teaching materials obtained results of 65.8 and media analysis obtained results of 62.4. Therefore, it is necessary to develop interactive student worksheet using the inquiry based learning model for grade 10th senior high school.

1. Introduction
Education is an effort to improve the quality of human resources to develop their potential and talents. 21st century education requires students who are critical, creative, communicative and collaborative. 21st century education makes students the center of the learning process so that they have knowledge, skills, attitudes and mastering technology [1]. Learning centered on students means students actively develop their own potential independently, think creatively, innovatively and work well together. This is in line with physics learning which provides direct experience for students to think creatively, communicate effectively and be scientific in investigating and solving problems. Physics is the science of discussing phenomena through a series of processes built on scientific attitudes consisting of three important components in the form of concepts, principles and theories[2].

Physics learning will run optimally if supported by teaching materials that can improve students' critical thinking skills. One form of teaching materials is the Student Worksheet (LKPD). LKPD is a material containing material, summaries, and instructions for the implementation of learning tasks that must be done by students, which refers to the basic competencies that must be achieved [3]. On the other hand, LKPD are sheets containing tasks that must be done by students [4]. So, LKPD is one of the teaching materials used by students to conduct investigative activities and problem solving in learning.
Teaching materials that are designed should be equipped with text, images, audio, animation, and video related to learning material and are interactive in nature. Interactive means that there must be at least two parties involved in the learning process [5]. First, of course, users of teaching materials and secondly the teaching materials themselves. Thus, there is a reciprocal relationship between students and teaching materials that can foster motivation to learn independently and improve learning outcomes.

In addition to the use of teaching materials, the implementation of learning also uses models that are in line with the expected goals. One model that guides students to find or investigate a concept is the Inquiry Based Learning (IBL) model. The IBL model is a learning process that stimulates students to ask various questions for each learning topic [6]. The IBL model consists of five phases namely orientation, conceptualization, investigation, conclusion and discussion [7]. The IBL model can guide students to think critically, logically, and systematically [8]. Implementation of the IBL model in learning involves students formulating questions that lead them to carry out investigations and efforts to build knowledge [9]. Thus, the use of the IBL model in learning students can find concepts through systematic and scientific thinking processes.

Based on observations made at SMAN 15 Padang in grade 10th, it was found that students were still difficult to understand the concept of physics. The use of teaching materials was still limited to printed and not interactive teaching materials, Learning media used had not motivated students to be active in learning and learning models, has not been implemented optimally. Therefore it is necessary to develop instructional materials and interactive media in the learning process in the form of interactive student worksheet using the Inquiry Based Learning model.

2. Research Method

This type of research is qualitative descriptive research. Descriptive research is done to describe, interpret and explain or explain a variable or condition [10]. The research data is in the form of descriptive data and qualitative data. Samples were taken from 30 students of grade 10th senior high school. The instruments of data collection used were questionnaires and interview sheets. The questionnaire was filled out by students and the interview sheet was filled out by the physics teacher. The scale on the questionnaire uses a Likert scale consisting of four alternative answers. After that, to find out the value obtained from each questionnaire statement, the score obtained is divided by the maximum score, then multiplied by 100%. The value of each indicator can be determined by equation [11]:

\[
Value = \frac{obtained\ score}{maksimum\ score} \times 100\%
\]

This classification category can be seen in Table 1.

| No. | Value   | Category   |
|-----|---------|------------|
| 1   | 90 < N \leq 100 | Very Good (A) |
| 2   | 75 < N \leq 90  | Good (B)      |
| 3   | 60 < N \leq 75  | Less (C)      |
| 4   | \leq 60          | Very Less (D) |

3. Results and Discussion

The results of this study are the percentage of initial analysis of interactive student worksheet using the inquiry based learning model that has been done in grade 10th SMAN 15 Padang. The initial analysis of interactive student worksheet using the inquiry based learning model includes analysis of students, analysis of teaching materials, media analysis, and analysis of learning activities.
3.1 Analysis of Students
Analysis of students is obtained through a questionnaire that has been given to 30 students of grade 10th at SMAN 15 Padang, as a sample. The questionnaire consists of several aspects, namely interest, motivation, learning style and the ability of students to understand physics material. Each of these aspects has several indicators and analysis of the characteristics of students is shown in Figure 1.

![Figure 1. Graph of students analysis](image)

Figure 1. shows that students' interest in learning is 68.33 with less category, learning motivation is 57.08 with less category, learning style is 62.08 with less category and the ability of students in understanding physics material is 54.16 with less categories. Overall analysis of the characteristics of students obtained an average value of 60.42. Based on these results it can be explained that the characteristics of students in physics learning are in the less category and need to be improved in each of these aspects.

3.2 Analysis of Teaching Materials
Analysis of the use of teaching materials in the form of student worksheet is obtained through questionnaires filled out by students. This questionnaire consists of several aspects, namely the appearance of more interesting and innovative student worksheet, the benefits of using student worksheet in learning, the completeness of the student worksheet component and the nature of interactive student worksheet. Analysis of the use of instructional materials is shown in Figure 2.

![Figure 2. Graph of learning material analysis](image)
Figure 2. shows that the appearance of the student worksheet gets a score of 72.5 with less categories, students feel the benefits of using student worksheet in learning to get a 73 value in good category, the complete component of the student worksheet scores 65.41 in the less category, the availability of student worksheet that provides feedback the value of 52.5 with a very less category. Overall analysis of teaching materials obtained an average value of 65.83. Based on these results it can be explained that the use of teaching materials in physics learning is in the less category and needs to be improved, especially in the development of interactive student worksheet. so that learning provides feedback / is interactive in nature, becomes more interesting, innovative, and can improve all student competencies.

3.3 Analysis of Learning Media
Analysis of learning media obtained questionnaires filled out by students. The instrument used is a questionnaire consisting of several aspects including: Use of learning media, Understanding the material of physics through learning media, the benefits of using learning media. Each of these aspects has several indicators and an analysis of the use of instructional media is shown in Figure 3

Figure 3. shows that the use of learning media obtained a value of 52.22 with a very lacking category, understanding the material using the media obtained a value of 73.33 with less categories, and the benefits of media in learning obtained a value of 61.67 with an unfavorable category. Overall, the analysis of physics learning media obtained an average value of 62.41 and was in the poor category. Based on these results it can be explained that aspects of the use of learning media have not been used properly. While the material is easily understood through learning media. Therefore, learning with media must be improved so that students' motivation and understanding increase.

3.4 Analysis of Learning Activities
Analysis of learning activities was obtained from the results of the teacher questionnaire. The instrument used is a questionnaire consisting of several aspects including preliminary activities, core activities and closing activities. Each of these aspects has several indicators and analysis of learning activities is shown in Figure 4.
Figure 4. Graph of Learning Activities Analysis

Figure 4. shows that the preliminary activities obtained a value of 75 with good categories, core activities obtained values of 67 with less categories, and closing activities obtained values of 70 with less categories. Overall analysis of physics learning activities obtained an average value of 70 and was in the less category. Based on these results it can be explained that learning activities have not been implemented properly. Therefore, learning activities using models must be improved so that students can find concepts well.

4. Conclusion
Based on the analysis that has been done, it can be concluded that the analysis of students gets an average value of 60.42 with less categories, the analysis of the use of instructional materials obtained an average value of 65.83 with less categories, analysis of the use of instructional media obtained an average value of 62 41 with less categories and analysis of learning activities obtained an average value of 70 with less categories. Therefore, it is necessary to develop an interactive student worksheet using the inquiry based learning model.

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