Analysis of students in the development students worksheet using inquiry based learning model with constructivism approach for physics learning high school class XII/I

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Abstract. The purpose of this study was to conduct analysis of student in the development of the Student Worksheet using an Inquiry Based Learning (IBL) model with a constructivism approach for physics learning high school class XII/I. The method used in this study was a qualitative descriptive method. The subjects of this study were students of class XII Science in Senior High School 10 Padang. Data collection instruments in the form of questionnaire sheets were used to find out the characteristics of students. The questionnaire sheets consists of 6 indicators with a total of 40 positive statement items. Based on the analysis of students, the student’s interest in physics learning is 71.17%, learning motivation of students towards physics learning is 69.15%, students prefer learning physics in discussion and experimenting with percentages 79.03% and 77.42%, the positive attitude shown by students during physics learning is 74.78%, student’s physical knowledge is 57.77%, the skills of students in experimenting is 67.88%. This results will be used as a benchmark for developing student worksheet using inquiry based learning model with constructivism approach for physics learning high school class XII/I.

1. Introduction

Physics is one of the subjects that plays an important role in producing quality Human Resources in order to keep up with the rapid development of Science and Technology. In fulfilling this demand, the subjects of Physics in High School aim to form students who have competencies covering 3 aspects, namely: aspects of knowledge, attitudes, and skills\cite{1}. In order to realize the learning objectives that are adapted to the development of science and technology, the government through the Ministry of Education and Culture mandates the implementation of the 2013 Curriculum. However, the reality encountered in schools shows that the Physics knowledge competence of students is still low. This was indicated by the value of the Physics Daily Repeat of students in Senior High School number 10 of Padang (SMAN 10 Padang), most of whom were still under the minimum completeness criteria. This shows that students have not understood Physics material well.

Based on the results of questionnaires conducted by SMA Negeri 10 Padang, it is known that learning has not been focused on students (student center). Teachers tend to use the lecture method in learning, so that students find it difficult to develop their own knowledge to find out what they are learning. Teachers as educators play an important role in realizing learning that can activate students. One way that learning like this can be created is by using quality teaching materials. One form of
teaching material is Student Worksheet. Student worksheet is a sheet containing tasks that must be done by students, these sheets usually contain instructions and steps to complete the task\textsuperscript{[2]}. With student worksheet, students will be required to be independent and can find their own knowledge learned. In addition, the teacher can also use learning models and approaches that can make students find their own knowledge, thus creating an active learning atmosphere. One learning model that can be used is an Inquiry Based Learning (IBL) learning model. The IBL model is able to improve the understanding, process skills and attitudes of students in learning\textsuperscript{[3]}. In order for students to construct their knowledge into learning, the IBL model can be combined with a constructivism approach. The constructivism approach is an approach that can make students use their own knowledge which is then constructed into learning\textsuperscript{[4]}. The constructivism approach will create students more active in understanding the material provided, so that the learning experience of students will increase according to what they do in the learning process.

Based on the explanation above, this study aims to find out the results of the analysis of the characteristics of students to develop student worksheet using the IBL model with a constructivism approach to physics learning in class XII of semester 1.

2. Method
This study was a qualitative descriptive research which is an initial analysis of development research to find out the characteristics of students in learning physics. The subjects of this study were students of class XII Science in Senior High School 10 Padang. Students who were the subject of this study amounted to 31 students. The data collected is primary data obtained directly from the original source.

Data collection techniques is distributing questionnaires. Data collection instruments in the form of questionnaire sheets. The questionnaire sheets were used to find out the characteristics of students. The questionnaire sheets were filled in directly by students as respondents. The questionnaire sheets consists of 6 indicators (interest in learning, motivation to learn, learning styles, attitudes, knowledge, and skills students with a total of 40 positive statement items. The questionnaire sheets using a Likert scale. The Likert scale in the form of statements whose answers are in the form of approval or rejection of the statement or question given\textsuperscript{[5]}. The data analysis technique of this study uses qualitative data analysis techniques. Analysis of questionnaire data on the characteristics of students was carried out in several steps, namely: first, respondents gave an assessment of each statement on the questionnaire sheets. If the respondent provides an alternative answer "strongly agree", then a score is obtained 4. If the respondent provides an alternative answer "agree", then a score is obtained 3. If the respondent provides an alternative answer "disagree", then a score is obtained 2. If the respondent provides an alternative answer "strongly disagree ", then a score is obtained 1\textsuperscript{[7]}. Second, do the final score calculation using the equation:

\[ S_k = \frac{\sum X_i}{X_{\text{max}}} \times 100\% \]  

Where:

\( S_k \) = score is obtained

\( X_i \) = score of each respondent

\( X_{\text{max}} \) = maximum score of the questionnaire for each indicator

Third, determine the categories for each indicator using the provisions in table 1.

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

(modified from Riduwan\textsuperscript{[6]})
3. Results and Discussion

The results of this study were obtained from the analysis characteristics of students in learning physics. There are 6 indicators in the analysis of the students characteristics, namely interest, learning motivation, learning style, attitudes, knowledge, and skills of students in learning physics. The results of analysis of student's interest indicators and motivation to learn physics can be seen in Figure 1.

![Figure 1. Graph of Analysis of Student Interest and Learning Motivation Indicators](image)

Figure 1 shows that the indicators of student's interest and motivation to learn Physics are in the good category. Interest and learning motivation are internal factors that can affect learning outcomes[7]. Thus, if the student's interest and motivation to learn Physics are getting higher, then the learning outcomes obtained are also getting better. However, in reality the learning outcomes of students are still low. This is because there are other factors that influence it.

The results of the analysis of student learning styles indicators can be seen in Table 2.

| Indicators                                           | Percentage (%) |
|------------------------------------------------------|----------------|
| Easy to remember Physics from what you see           | 66.13          |
| Easy to master Physics after hearing the teacher's   | 79.03          |
| explanation                                         |                |
| Likes discussion learning                            | 67.74          |
| Love learning with practical activities (experiments)| 77.42          |
| Easy to master Physics after practicing              | 68.55          |

Based on Table 2 it is known that students most like learning by listening to the explanation of the teacher with a percentage of 79.03%. This means that learning in class is still focused on the teacher. Though learning like this is not recommended in the 2013 Curriculum because it tends to make students become passive in learning. Conversely, the expected learning is learning that can make active students (student centers), so that students' thinking skills can develop. Furthermore, from the results of the analysis of learning style indicators it is known that students also like learning by practicing with a percentage of 77.42%. While for indicators "easy to master physics after practicing" and "liking discussion learning" have not shown such a high percentage. But actually this kind of learning is demanded by the 2013 Curriculum. Learning like this can foster the independence of students in learning so that learning centered on students can be created. Students can build their own knowledge, so they understand more about what they are learning.

The results of the analysis of the indicators of attitudes, knowledge, and skills of students in learning physics can be seen in Figure 2.
Figure 2. Graph Analysis of Attitudes, Knowledge and Skills Indicators of Students in Physics Learning

Figure 2 shows that the indicators of attitudes and skills of students are in the good category, while the knowledge indicator is in the category of good enough with a percentage of only 59.77%. This is also evidenced by the low learning outcomes obtained by students during the daily Physics test as described in the introduction. This is not in accordance with the objectives of Physics in High School which aims to form students who have competencies covering 3 aspects, namely: aspects of knowledge, attitudes, and skills.

Based on the results of the data analysis above, conducive learning is needed. Conducive learning can activate students, so learning by lecture method can be avoided.

4. Conclusions
Based on the results of research and discussion, it can be concluded that the Physics knowledge competence of students is still low. This is because learning is still teacher-centered. Teachers as educators can overcome them by using teaching materials that can improve student's physical knowledge competencies. This teaching material is in the form of student worksheet by using learning models and approaches that can shape the independence of students in learning. Based on this, it is deemed necessary to develop student worksheet using the Inquiry Based Learning model with a constructivism approach in the 1st semester of the 12th grade high school physics material.

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