

PROBLEM BASED LEARNING (PBL) MODEL ON STUDENTS' LEARNING OUTCOMES IN HYDROCARBON MATERIALS

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Abstract

To improve student learning outcomes requires a learning model that is consistent with the problem-based learning model. This model requires the active participation of each student in solving problems through discussion in order to create an exchange of ideas between students. The results of the review of learning based on problem based learning methods, through this learning model obtained good responses from students. This proves that the problem-based learning model has a positive effect on students. The method used is based on a review of 29 journal articles as secondary data sources and 3 relevant journal articles as primary literature with a bibliographic approach using VOSviewer software. Based on the 29 articles studied, the problem-based learning model improves student learning outcomes on hydrocarbons by an average of 67.65%.

Keywords: *Problem based learning, learning outcomes, hydrocarbons.*

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INTRODUCTION

Education basically aims to help humans develop themselves so that they can face all changes and problems openly and creatively without losing their identity. Chemistry is considered one of the most difficult subjects for most students. This is caused by complex and abstract concepts which are one of the reasons why students find it difficult to learn chemistry. Even though the concept is complex and abstract, chemistry is also one of the sciences that is very close to our daily lives. Even though it is very close to everyday life, chemistry remains a subject that most students find difficult.

Problem-based learning (PBL) is an approach to learning in a learning environment that embodies several principles that promote active learning, collaboration, and rapid feedback. Problem-based learning encourages students to learn the basic principles of problem solving. Real world problems that students often encounter in everyday life. The problem-based learning model provides opportunities for students to explore data collection to solve problems, allows students to think critically, analytically, systematically, and logically so that it is possible to find alternative solutions (Listetiowati, 2013).

The hydrocarbon material is considered difficult for students, and about 37% of students only reach KKM 70 in their cognitive ability. This is because (1) according to IUPAC, students cannot identify the names of hydrocarbon compounds (alkanes, alkenes, alkynes). (2) being able to determine and distinguish isomers of alkanes, alkenes and alkynes, (3) analyzing the chemical properties of hydrocarbon compounds, (4) internal factors in which most students do not play an active role, students' awareness and motivation arises during learning, making it difficult for students to understand what they are learning or to analyze questions posed by teachers in ways that affect student learning outcomes.

The application of the problem based learning learning model is expected to increase student activity. This prompted the authors to consider the problem as a context and driving force for students to determine and improve cognitive skills, affective aspects, and psychomotor aspects. Through the application of this problem based learning learning model, students are expected to be able to improve their understanding and learning outcomes in the material of hydrocarbons.

RESEARCH METHOD

The method used in writing this article is to review 29 journal articles as secondary sources and 3 journal articles as primary sources using a bibliographical approach using VOSviewer software. Bibliography itself is defined as measurement or analysis of books, journals or literature using a mathematical and statistical approach. VOSviewer is a software that can be used to visualize a bibliometric network of journals, titles, authors, authors, publications, etc. (1) Determination of search keywords, library research in the form of journal articles using three main keywords, namely "Improving Learning Outcomes", "Problem Based Learning Models", and "Hydrocarbon Material". Found 29 journal articles related to these keywords (2) Search

results of the 29 journal articles were then saved in RIS format using Mendeley software to enter all important article information such as article title, author name, abstract, keywords and references (3) Data input to the VOSviewer software to map or visualize the bibliometric network. The strength of the relationship between two items will be represented by the proximity of the items on the map and the thickness of the line connecting them. The higher the co-author network, the closer items will appear on the map and the thicker the lines connecting them. The visualization results can be seen in the following figure:

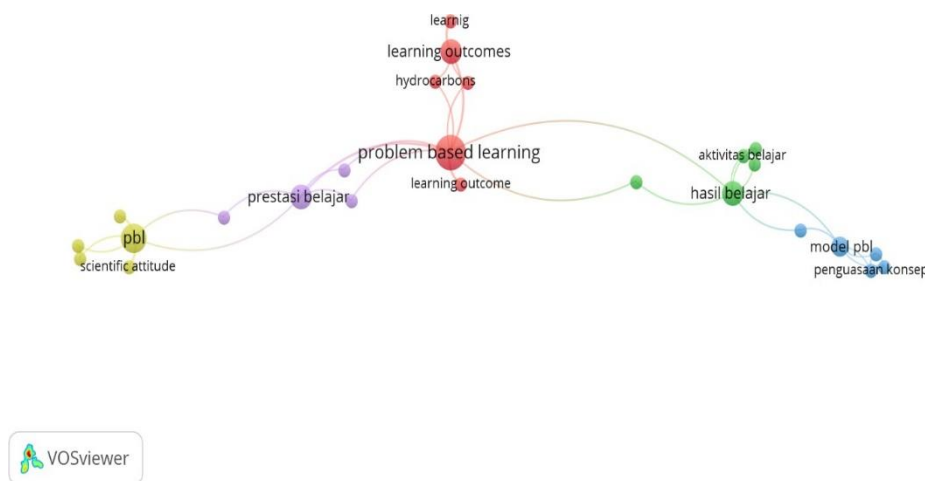


Figure 1. VOSviewer Visualization Results

Writing articles is done to find out the increase in student learning outcomes along with the use of the Problem Based Learning learning model. Writing data was obtained through a review of 29 previous research journal articles and 3 relevant journal articles as primary literature. The following is a data processing table to determine the increase in student learning outcomes:

Table 1. Criteria for improving learning outcomes

Interval	Kriteria
$80 < X$	Excellent
$60 < X \leq 80$	Good
$40 < X \leq 60$	Intermediate
$20 < X \leq 40$	Less
$0 < X \leq 20$	Very Less

RESEARCH RESULT AND DISCUSSION

Through the Problem Based Learning learning model, students actively and critically respond to problems that arise related to learning materials so that student learning outcomes will increase. When compared to conventional learning models, students only memorize the concept of hydrocarbon material without the need to involve student activities that can stimulate thinking skills so that student learning outcomes will increase.

Problem Based Learning or problem-based learning models are designed so that students gain important knowledge that makes them proficient in solving problems, having skills in participating in groups, being able to group and communicate the results of problem solving that you receive. Applying the PBL model with several syntaxes includes: 1) Orientation of students to problems, (2) Organizing learning activities, (3) Guiding individual and group investigations, (4) Developing and presenting results (5) Analyzing and evaluating the problem solving process.

Solving problems with the PBL model students construct their own knowledge and apply it in problem solving. Students are required to actively construct their conceptual framework independently through syntax in Problem Based Learning. From the table it can be seen that there was an increase in the learning outcomes of 3 schools which, from the results of the primary journal review, obtained an average result of an increase in cognitive aspects of 78.82%, affective aspects of 69.24% and psychomotor aspects of 59.99%. The overall average aspect has increased by 67.65%. The percentage obtained is classified as moderate in improving student learning outcomes. This is in accordance with several research results in reviewed journals, revealing that the Problem Based Learning learning model can improve student learning outcomes in cognitive, affective and

psychomotor aspects. The use of the PBL model is considered more effective and efficient compared to other learning methods in improving student learning outcomes in hydrocarbon material.

The average student learning outcomes after using the Problem Based Learning learning model based on several previous studies are presented in the following table:

Table 2. Percentage of increased student learning outcomes with the PBL model

High School	Increase Percentage		
	Cognitive	Affective	Psychomotor
SMAN 10 BANJARMASIN	74.28%	71.74%	55.64%
SMAN 7 REJANG LEBONG	78.53%	68%	68%
SMA YPK IMMANUELMANOKWARI	83.67%	72.68%	56.33%
Rata-rata	78.82%	69.24%	59.99%

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusion

Based on the journal articles that have been reviewed, it can be concluded that using the problem-based learning model can improve student learning outcomes in hydrocarbon chemistry material. Through the PBL model, students play an active role in solving problems through group discussions, thus enabling interaction between students through the exchange of ideas or transmission of ideas, ideas, or opinions by finding solutions to problems.

B. Suggestion

Based on the results of the review that has been done, the reviewer will provide some suggestions that might be useful for the next reviewer. It is hoped that the next journal review will be even better than this. There are a number of things that might be done, namely by preparing a lot of journals on matters that you want to discuss, and also through the case study method or through quantitative research. So that later the writer can easily develop the theme that will be taken in making the paper itself.

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