



The Effect of the Implementation of the Problem Based Learning (PBL) Model on Budget Planning Ability (RAB) Vocational High School Students (A Meta Analysis)

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Abstract. The purpose of this study was to determine the effect of the problem based learning (PBL) learning model on student learning outcomes in the Subject of Budget Plan (RAB). The research method used is quantitative with a meta-analysis approach. The data sources used are the results of ten studies that have been published in journals that have the same/similar research theme/title, although the research design is different. Meta analysis is used to calculate the effect size coefficient, the results of which can describe the relationship between the variables studied. The results showed that (1) there were three articles with a low effect size category and seven articles with a high effect size in explaining the influence of PBL on the ability to plan budgets, (2) another effect size calculation obtained a figure of 0.87 in the medium category for class X and of 0.36 with a low category for class XI, (3) calculations to explain the influence of learning media obtained an effect size of 0.40 in the low category for mock-up media and 0.78 in the medium category for module media. The conclusion from the results of this study is that PBL has an influence on learning outcomes for RAB subjects, module media is better than mock media, and the influence in class X is greater than class XI.

Keywords: Effect Size · Learning Outcomes · Budget Plan (RAB) · Meta-Analysis · Problem Based Learning (PBL)

1 Introduction

The learning model is a framework that provides a systematic description for implementing learning in order to help students learn with certain goals to be achieved. That is, the learning model is a general description but still has a specific purpose. This makes the learning model different from learning methods that have implemented learning steps or approaches that are even wider in scope. The above definition is in line with the opinion of Glazer [1] which states that the learning model is a conceptual framework that describes learning procedures systematically to manage student learning experiences so that certain desired learning objectives can be achieved. According [2] the learning

model is a plan or a pattern that is used as a guide in carrying out classroom learning or learning in tutorials. Joyce & Weil in [3] argue that the learning model is a plan or pattern that can be used to form a curriculum (long-term learning plan), design learning materials, and guide learning in the classroom or in other learning environments.

According to Kardi & Nur in [4] the learning model has four special characteristics that distinguish it from strategies, methods, or procedures. These characteristics are that the learning model is a logical theoretical rationale compiled by its creators or developers, in the form of a rationale about what and how students will learn (having learning and learning goals to be achieved), and the learning behavior needed so that the model can be implemented successfully, and the learning environment is needed so that the learning objectives can be achieved.

One of the learning models is Problem Based Learning (PBL). Problem Based Learning (PBL) is a learning model that focuses on problems as a context for gaining knowledge. Januaryansyah [5] states that PBL is learning that encourages students, both through individual and group learning, to find real solutions so as to increase curiosity, critical thinking skills, as well as the ability to analyse learning materials. This learning model is a challenge for teachers, to encourage and direct students to play an active role such as asking questions and finding solutions independently in solving real problems, so that learning outcomes can be maximized. The main purpose of learning is to optimize student learning outcomes. Sudjana [6] stated that learning outcomes are achievements achieved by students after receiving learning activities or experiences.

Hamdani [7] states that the media is a component of learning resources or physical vehicles that contain instructional materials in the student environment, which can stimulate students to learn. Media is everything that can be used to channel messages (learning materials), stimulate thoughts, everything that can be used to channel messages, stimulate students' thoughts, feelings, attention and abilities, so that it can encourage the learning process. Gerlach & Ely in [8] say that the media, if understood in broad terms, are humans, materials, or events that build conditions that enable students to acquire knowledge, skills, or attitudes. In this sense, teachers, textbooks, and the school environment are media. More specifically, the notion of media in the teaching and learning process tends to be defined as graphic, photographic, or electronic tools for capturing, processing, and rearranging visual or verbal information. Arsyad [8] suggests that the use of media in the teaching and learning process can generate new desires and interests, generate motivation and stimulation of learning activities, and even bring psychological effects on students. Learning media can be regarded as a tool that can stimulate students to the learning process.

2 Method

This study uses quantitative research methods with secondary data sourced from relevant research results that have been published, so that the population in this study is research articles that are relevant to the topic of applying the PBL learning model.

Table 1. Effect Size Calculation Results. Influence of PBL Learning Model with Student Learning Outcomes RAB Subjects

Journal	Effect Size (d)	Category
Journal 1	0,22	Low
Journal 2	0,34	Low
Journal 3	0,41	Low
Journal 4	1,02	High
Journal 5	1,03	High
Journal 6	1,03	High
Journal 7	1,11	High
Journal 8	1,12	High
Journal 9	1,11	High
Journal 10	1,40	High

Table 2. The Great Effect of PBL on Class Levels

Artikel	Effect Size (d)	Category
Class X	0,87	Currently
Class XI	0,39	Low

3 Results and Discussion

Calculation of effect size is a very important component in carrying out meta-analysis. This quantity is the quantity used to show the magnitude of the effect of the treatment of the relationship between two variables. The formula used in calculating the effect size can be translated using Cohen's interpretation. The results of the calculation of the effect size on the ten samples of this research article, in order to determine the effect of the PBL learning model on the learning outcomes of students in RAB subjects, are as follows.

The calculation results show that there are four articles with low effect size prices and seven articles with high effect sizes, it can be interpreted that 70% of the research results show that there is an effect of the application of the PBL model on student learning outcomes in the mechanics subject of Budget Plan (RAB).

The sample used in this study was ten studies, while the unit of analysis was students in class X and XI, therefore the analysis was continued by looking at the effect of the PBL model on student learning outcomes in the subject of Budget Plan (RAB) for class X and XI.

The ten samples of this study used the PBL learning model, six studies were combined using module media, and four were combined with mock media. The next step is to analyse the influence of PBL on the media in the learning process. The following table

Table 3. The Great Effect of PBL on Class Levels

Artikel	Effect Size (d)	Category
Modul	0,79	Currently
Mock-up	0,38	Low

is the result of the calculation of the meta-analysis of the influence of the PBL model on learning outcomes combined with learning media.

The results of the calculation of the effect size on the learning media show that there is an influence of the PBL learning model with the media used on the learning outcomes of students in the subject of the Budget Plan (RAB). Media Modules have a greater influence than mock-up with an effect size of 0.79 with a low category for module media and 0.38 with a medium category for mock-up.

It can be comprehensively explained that the application of PBL has a positive influence in improving student learning outcomes in the subject of Budget Plan (RAB). This is in line with the results of research conducted by Bakri [9], showing that the application of PBL in vocational schools in practical learning can increase students' interest and practical ability in the practice of winding transformers, as well as research by Abdullah and Ridwan [10], stating that in the application of PBL there are improvement of student learning outcomes.

In the field of science, the results of this meta-analysis are in line with the research results of Orhan & Ruhan [11], which states that the PBL model has a positive impact on students' academic achievement and students' attitudes towards science. In another field, in the implementation of PBL in health schools, PBL has a positive impact on the competence of doctors in the social and cognitive dimensions [12].

The results of the research above empirically strengthen the opinion of Brownell & Jameson [13] which suggests that PBL is a learning model by giving problems to students, so that students are able to dig up information, analyse, and solve the problems presented. Also according to Graaff & Kolmos [14] that PBL is an instructional method that requires students to learn to work together in groups to find solutions to real problems. Problems are used to relate students' curiosity, analytical skills, and initiative to the subject matter. PBL prepares students to think critically and analytically, and to use appropriate learning resources.

4 Closing

The problem based learning (PBL) model has been shown to have a positive influence on student learning outcomes in the RAB training courses in grades X and XI. Thus the implication of the results of this study is that efforts to improve student learning outcomes can be done through the application of the PBL model. For this reason, it is necessary that the results of this study can be considered for its application in more comprehensive learning by teachers in the classroom. This meta-analysis research using the calculation of the effect size is expected to be able to provide a foothold for further

studies in order to further multiply the sources of research data used to analyse the effect size, so that the resulting research is more perfect.

References

1. Glazer, E. (2001). *Problem based instruction*. In M. Orey (Ed.), *Emerging perspective on learning, teaching, and technology*, <http://www.coe.uga.edu/epltt/ProblemBasedInstruct.htm>.rianto. (2015). *Model pembelajaran terpadu*. Jakarta:PT. Bumi Aksara.
2. Rusman. (2018). *Model-model pembelajaran*. Depok:Raja Grafindo Persada
3. Ngalmun (2016). *Strategi dan model pembelajaran*. Yogyakarta:Aswaja Pressindo
4. Januariansyah, Sapitri. (2020). Pengaruh problem based learning dalam pembelajaran kejuruan: sebuah meta analisis”. *JMEL*. 9 (2).
5. Sudjana, Nana. (2010). *Penilaian hasil proses belajar mengajar*. Bandung:PT. Ramaja Rosdakarya.
6. Hamdani. (2011). *Strategi belajar mengajar*. Bandung:Pustaka Cipta
7. Arsyad, Azhar. (2013). *Media pembelajaran*. Jakarta:PT. Raja Grafindo Persada
8. Bakri, Hasrul. (2009). Peningkatan minat belajar praktek menggulung trafo melalui pendekatan pembelajaran berbasis masalah (PBL) pada siswa SMK Negeri 3 Makassar. *Jurnal Medtek*, 1 (1) April, 2–8.
9. Abdullah, Gafar & Ridwan, T. (2008). Implementasi problem based learning (PBL) pada proses pembelajaran di BPTP Bandung. *Jurnal Universitas Pendidikan Indonesia*, VII (12).
10. Akinoglu, O., & Tandogan, R. O. (2007). The effects of problem based active learning in science education on student's academic achievement, attitude and concept learning. *Eurasia Journal of Mathematics, Science & Technology Education*, 3 (1), 71-81.
11. Gerald Choon-Huat Koh., Hoon Eng Khoo., Mee Lian Wong., et.al. (2008). The effects of problem based learning during medical school on physician competency: a systematic review. *Canadian Medical Association Journal*, 178 (1), 34-41.
12. Brownell, J., & Jameson, D. A. (2004). Problem based learning in graduate management education: an integrative model and interdisciplinary application. *Management Education*, 28(5), 558-577.
13. Graaff, E. D., & Kolmos, A. (2003). Characteristics of problem based learning. *Int. J. Engineering Ed.*, 19 (5)

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