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# The Influence of PBL Integrated with Mind Mapping on the Student's Learning Outcomes

**Vindy Devyana Sukma Dewi[1], Siswandari[2], Khresna Bayu Sangka[3],**
[1,2,3]Sebelas Maret University, Email: [1]vindydevyana@gmail.com, [2]siswandari@staff.uns.ac.id, [3]b.sangka@staff.uns.ac.id

Economics lessons are one of the required subjects in high school and have an important role in the quality of learning. Economic learning has characteristics based on real life, so problem-based learning (PBL) is very suitable in economics learning, sometimes students face problems in memorizing various economic concepts both in material and graphic. To make it easier for students to make notes in the form of concept maps, therefore the use of mind mapping was chosen.This type of research is quasi-experimental with a pretest-post-test control group design. The number of samples in the study was 144 students, consisting of 72 control class students and 72 experimental Senior High School class of students. The data collection technique is a multiple choice test as many as 20 questions. The data analysis technique used was an independent sample t-test. The results showed that the t-test obtained a Sig value of .003 < 0.05, meaning that there was a significant effect of integrating the PBL model with mind mapping on student learning outcomes. Teachers in the field of economic studies can use the PBL model integrated with mind mapping to make it easier for students to understand economic concepts.

**Keywords**: *Learning, PBL, Mind Mapping, Learning Outcomes*

## Introduction

The quality of learning can be seen from learning activities and also from student's understanding based on basic competencies and indicators that must be achieved, as well as the performance of teachers who support the learning process. Quality can be interpreted as a measure of whether something is good or bad, the level of quality or degree of intelligence or intelligence (Yugis, 2018). There are several components are directly related to the learning system to support the quality of learning, namely 1) students, good background and family environment that supports children's learning patterns; 2) competent graduates as expected; 3) the learning process, the learning process must form student curiosity; 4) teachers, teachers must be able to create innovative creative learning processes concerning learning objectives; 5) curriculum, subjects or courses that contain logical material to achieve learning objectives; and 6) the use of materials (Alifah, 2021). Criteria that support effective learning and teaching always involve two active parties, namely: an educator and students (Yugis, 2018). Thus, improving the quality of education cannot be separated from the role of teachers in implementing the learning process as the main activity in schools, one of which is economic learning.

Economics subjects are important lessons because economics subjects study production, distribution and consumption activities to meet the needs of human life to achieve a level of prosperity (Sari, Piliani & Alit, 2019). Economics is a subject that teaches human efforts to find options in utilizing limited resources to survive (Valentina, Nugrahadi, & Budiarta, 2019). So basically economics is a science that teaches choosing from various alternatives due to limited available resources. Kemdikbud (2014) states that one of the objectives of learning economics is the students can develop behavior and form wise, rational and responsible attitudes by using knowledge and skills in economics.

Based on the results of observations in one of the X-grade Senior High Schools, it was shown that students' learning outcomes in economics were still relatively low compared to other subjects. The average value of the first rank is Indonesian Language subject with a value of 78.15, the second rank is Geography with a value of 75.45, the third rank of Sociology with a value of 75.25, the fourth rank of English subjects with a value of 73.13, the fifth rank of Economics with an average score - an average of 71.87, and ranked sixth in Mathematics with an average score of 71.60. More complete data are presented in table 1.1

Table 1.1Comparison of Student Learning Outcomes for Each Subject

| Class | Subject | | | | | |
|---|---|---|---|---|---|---|
| | Indonesian | English | Math | Economics | Sociology | Geography |
| X.A | 78,00 | 73,50 | 72,09 | 71,09 | 75,92 | 77,76 |
| X.B | 79,75 | 72,38 | 71,95 | 72,37 | 76,40 | 75,75 |
| X.C | 79,97 | 73,42 | 71,55 | 72,06 | 74,90 | 74,47 |
| X.D | 79,60 | 73,15 | 71,30 | 71,87 | 75,52 | 76,60 |
| X.E | 76,30 | 73,65 | 71,10 | 70,75 | 74,64 | 75,83 |
| X.F | 74,94 | 74,50 | 71,25 | 71,20 | 74,70 | 75,20 |
| X.G | 78,62 | 72,10 | 72,15 | 72,87 | 75,20 | 73,65 |
| X.H | 78,00 | 72,35 | 71,40 | 72,78 | 74,70 | 74,30 |
| Average | 78,15 | 73,13 | 71,60 | 71,87 | 75,25 | 75,45 |

Source: SMAN 1 Pulokulon (2022)

Murdiyah, Suratno & Ardhan (2020) said that the main weakness of the education system in developing countries is the selection of the wrong learning method. Sometimes students find it difficult to demonstrate new knowledge with existing ones because their learning is often done in general. Teachers do not consider it unimportant to regulate students' active learning, so that it has an impact on learning outcomes. Furthermore, Chatila & Husseiny (2016) most of the learning methods that are often used are direct learning because they do not require much preparation and save time.

According to Depaerment of National Education/ Depdiknas (2003) characteristics economic subjects are: 1) subjects that depart from facts or economic phenomena that exist in real life. The real problem faced is scarcity is economics is needed to explain these symptoms; 2) economics subjects develop theories to explain facts rationally; 3) In general, the analysis used is a problem-solving method. The problem-solving method is suitable for use in economic analysis because the object in economics is the basic problem of economics (what, how and for whom because of scarcity); 4) the importance of economics is to choose the best alternative. Thus problem-based learning can be applied to make it easier for students to understand economic concepts at school.

Kassymova, et al., (2020); Siagian, Saragih, & Sinaga (2019) stated that problem based learning is a model that begins by giving students real-world problems to solve, so that students' mindsets are formed to solve the problems given. Thorndahl & Stentoft (2020) explained that problem-based learning is a work method that improves the ability to analyze and collaborate and have a critical view.

The success of the PBL model requires a lot of time and preparation in its application, students are also not used to it because at first they were only used to taking notes, listening and memorizing all the material given by the teacher. In economics learning, students are

often faced with various problems, given the many concepts that must be memorized by students both in material and graphics (Purba, et al., 2021). Thus, it is necessary to do the right strategy to cover the weaknesses of the PBL model and make it easier for students to remember economic material, namely by mind mapping. The mind map is one of learning that can develop thinking and use all student skills, help students and teachers in the learning process in class by summarizing materials, formulating problems to be presented and easy to remember (Jariyah & Harahap, 2018; Sipayung, Susanti, & Dewi, 2019).

Mind mapping can make students more creative and learning fun, because the process of mind mapping is making a concept map consisting of colors, symbols, images and also writing. Mind mapping varies notes more interestingly (Dewi & Suadnyana, 2020). The main concepts learned are all identified and well woven, then narrated in their respective language styles and familiarize students to think quickly in developing their ideas through concepts in the brain (Kulsum, 2018). Mind mapping has the advantage that it is easier to understand and faster in solving problems (Jacub, Marto & Darwis, 2020).

Research conducted by Murdiyah, et al., (2020) shows that the PBL model integrated with mind mapping is very helpful for students in understanding learning and has a positive influence on student's cognition. In addition, research conducted by Ravindranath, Abrew & Nadarajah, (2016) regarding student perceptions of the mind mapping model in PBL states that mind mapping helps students summarize discussions in the PBL model so that it can improve the PBL learning process. So it is predicted that the integration of the PBL model with mind mapping will make it easier for students to understand economic learning so that it will have an impact on student learning outcomes.

## Literature Review

### *Problem Base Learning*

According to Malmia, et al., (2019), through the problem-based learning model, students are used to learning from real and factual problems in everyday life, and students are also used to study groups and discussions, as well as learning to studying problems, seeking relevant information, compile the information obtained, review existing alternative solutions, propose alternative solutions and develop resolution actions. Heppyandari & Puspasari (2019) problem based learning has several advantages, namely: 1) problems taken in consent with real life, 2) concepts according to student needs, 3) fostering the nature of student inquiry, 4) conditions that require students to interact and study in groups. will be able to achieve student learning mastery.

### *Mind Mapping*

According to Basri & Syamsya (2020); Nursoviani, Sahal & Ambara (2019) mind mapping is a visual learning model that can balance the learning process with how the brain works. The use of mind mapping can align both sides of the brain function, namely the right brain and left brain according to their respective portions, with a combination of colors, curved images and branches that will visually stimulate brain performance, so that the information obtained is easy to remember. Mind mapping uses a technique of combining images with words to build knowledge between topic keywords, thus allowing students to effectively store the information conveyed (Wu & Wu, 2020). Mind mapping is a way to take notes that is not boring, because it consists of words, colors, lines, and pictures. Mind mapping is used to draw learning ideas and concepts with pictures and text (Rachmawatia, Nugrahaeni & Mauludiyah, 2020). The advantages of Mind Mapping according to Bawaneh (2019) are: 1) increasing student concentration; 2) converting written data into easy-to-understand formulas; 3) converting verbal communication to symbols, pictures, and diagrams; 4) changing conventional or traditional learning patterns; 5) increase student motivation; 6) presenting more interesting data; 7) balance right and left brain function.

### *Learning Outcomes*

Learning outcomes are a description of the success of the ongoing learning process in educational institutions (Martini, Tripalupi & Haris, 2019). Learning outcomes are the results obtained by students after carrying out the teaching and learning process within a certain time whose results are in the form of numbers. Mustika & Rahmi (2019) stated that learning outcomes are a measuring tool to determine the level of success of students in understanding the material presented by the teacher. Evaluation activities are used to obtain evidence data that shows the extent to which students can understand the material in achieving learning objectives. According to Masniwati (2018), the indicators of learning outcomes are: the achievement of absorption of learning and student behavior outlined in the learning objectives have been achieved, both individually and in groups.

## Research Methods

This type of research in quasi-experimental because the authors cannot fully control the two groups studied so the changes that occur are not fully influenced by the treatment given (Amin et al., 2020). This study uses a pretest-posttest design with control group (Creswell, 2014). The purpose of this study was to determine the results of student learning about economics, this was obtained through an experimental process using quantitative data. In this case, the student were the experimental group who were given the type of learning using the integrated PBL model with mind mapping. Then the students from the control group will be given the type of learning with a conventional model. Before the students were given the

treatment, all students had to do an initial ability test to find out that both classes had the some initial ability (budiyono, 2016). The technique used for data collection is in the form of a written test. The instrument is used to measure the result of student learning. The research design is shown in table 3.1 below.

Table 3.1 Design Research

| Group | Pretest | Treatment | Postest |
|---|---|---|---|
| Experiment | $Q_1$ | x | $Q_3$ |
| Control | $Q_2$ | | $Q_4$ |

Q1: pretest for the experimental class; Q2: pretest for the control class
X: PBL learning model is integrated with mind mapping media;
Q3: experimental class posttest, Q4: control class posttest.

This study used 144 students from high school in the 2022/2023 academic year in Grobogan district. The experimental class consisted of 72 students and the control class 72 students. The instrument used is a written test in the form of multiple choice as many as 20 multiple choice questions that been empirically validated. The validation calculation uses the results of the Pearson Product Moment correlation with a score of > 0.3202 (valid) and the reliability results using Cronbach Alpha with a score of 0.618. The data was obtained from the pretest-posttest scores of students' learning outcomes in the control class and the experimental class in 2 meetings.

Before doing the treatment, the students' initial ability test was conducted to find out that the two classes had the same initial ability (Budiyono, 2016). The results of the sample t-test showed that both the experimental class and the control class were in a balanced state. The data collection technique used was a written test. The instrument is used to measure student learning outcomes.

To test the effect of the PBL model integrated with mind mapping on learning outcomes was used independent sample t-test. Pre-requisite tests were first carried out to find out that the data were normally distributed and homogeneous. The Shapiro-Wilk test was used to determine there the data were normally distributed and the Levene's test was used to test for homogeneity. If the results of the significance of the Shapiro-Wilk test are > 5%, the data is normally distributed, and the data is said to be homogeneous if the significance results are > 5%. The test decision is concluded if the results of the significance are < 5%, the PBL model integrated with mind mapping has a positive effect on learning outcomes. The data is processed using SPSS software.

**Results and Discussion**

The research data were collected from one hundred and forty-four high school students, seventy-two each as the experimental class and the control class. The description of the pretest and post-test data is shown in table 4.1

Table 4.1 Description of the Comparison of Pre-Test and Post-Test of Control and Experimental Class

| No | Uraian | kelas Eksperimen | | Kelas Kontrol | |
|---|---|---|---|---|---|
| | | Pre Test | Post Test | Pre Test | Post-test |
| 1 | Minimum | 25 | 50 | 25 | 45 |
| 2 | Maximum | 80 | 100 | 80 | 100 |
| 3 | Mean | 53.47 | 79.44 | 54.16 | 73.75 |
| 4 | SD | 11,25 | 11,31 | 11,69 | 11,38 |

Source: Data Process (2022)

Table 4.1 shows that the average value of student learning outcomes before and after being taught the PBL integrated mind mapping model was 53.47, increasing to 79.44. Furthermore, the average value of student learning outcomes before and after being taught with the model commonly used by teachers increased from 54.16 to 73.75. If you look at the results of the pretest, it shows that the two classes have almost the same value, but when compared to the results of the posttest, it shows that the average score of the experimental class students is higher than the control class.

There are requirements must be carried out before conducting research, namely normality and homogeneity tests. The results of the pretest and posttest normality tests using Shapiro Wilk using SPSS obtained the results of Sig. > 0.05, meaning that the data is normally distributed. Furthermore, the results of the homogeneity test using Levene's Test for Equality of Variances analysis obtained the value of Sig. > 0.05, meaning that the data also comes from groups that have homogeneous variance. The calculation results are shown in table 4.2

Table 4.2 Normality and Homogeneity Test

| **Class** | | **Shapiro-Wilk** | | | **Test of Homogeneity of Variance** |
|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Sig. |
| Posttest | Experiment | ,967 | 72 | ,053 | ,652 |
| | Control | ,967 | 72 | ,052 | |
| Pretest | Experiment | ,971 | 72 | ,095 | ,730 |
| | Control | ,974 | 72 | ,134 | |

Source: Data Process (2022)

After the prerequisite test is done, then the hypothesis is tested using the t-test. The results of the t-test test obtained the value of Sig. .003 < 0.05. This shows that there are differences in learning outcomes between the experimental class and the control class, where the average value of student learning outcomes in the experimental class is higher than the average value of the control class. The results of calculations using SPSS are shown in table 4.3

Table 4.3 Independent Samples Test

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | |
|---|---|---|---|---|---|---|---|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference |
| Equal variances assumed | .031 | .861 | 3.013 | 142 | .003 | 5.694 | 1.890 |
| Equal variances not assumed | | | 3.013 | 141.995 | .003 | 5.694 | 1.890 |

Source: Data Process (2022)

Based on the results of hypothesis testing, shows that the PBL model integrated with mind mapping has a positive effect on student economic learning outcomes. This is by research conducted by Jariyah & Harahap (2018); Murdiyah, et al., (2020); Sipayung, et al., (2019) which is proven to be able to facilitate students in understanding learning and has a positive effect on student learning outcomes. In PBL, the strategies used are problems that are often used in everyday life so that students can easily apply what is learned in class, meaning that the knowledge gained is not abstract (Erlangga, et al., 2021).

Problem-based learning has characteristics starting from problems that must be solved, investigating and solving given problems, thus students must find out and develop their abilities to solve these problems. This is also by the statement of Haryani, et al., (2019); Juandi (2020) that PBL requires every student to play an active role, explore curiosity and develop thinking skills so that it affects learning outcomes. Bashith & Amin (2017) said that the PBL model affects student learning outcomes because: 1) the PBL model is problem-based learning; 2) the PBL model teaches students to solve problems through group discussions); 3) lessons on prioritizing capacity building and information processing; 4) connecting the real world with the material to be studied; 5) help develop critical thinking skills; and 6) creating a new level of student motivation.

The integration of the PBL model with mind mapping is carried out by: 1) students are formed into several groups and are oriented to economic material problems; 2) each group records every solution to the given problem; 3) creating a mind map based on the

investigation carried out; 4) analyze and evaluate the results of problem solving that have been made by students (Asiah, Sudarti & Lesmono 2016). PBL assisted by mind mapping is learning that presents problems in real life with group members, then each member makes problem solving results in the form of branches of mind so that students become creative, and more enthusiastic which helps students to improve their learning outcomes (Dewi & Suadnyana, 2020).

The experience of students in solving problems makes students forced to think, problem solving activities are also arranged systematically, making summaries and because in mind mapping there are pictures and colors that make it easier for students to understand learning. Mind mapping is composed of keywords and meaningful symbols, related to curved lines and consists of various colors (Astriani, et al., (2020). Students are required to be responsible for learning, namely solving problems and expressing the results of their thoughts. Sipayung, et al., (2019) stated that PBL learning with mind mapping triggers students to be more focused, interested, active and enthusiastic in learning, where each student shares information and works together in solving problems.

The way of thinking using mind mapping does not only use the left brain, but also uses the right brain, to improve understanding of concepts and can improve problem solving abilities (Ma'ruf, Syafi'i & Kusuma, 2019). The use of problem based learning with mind mapping makes it easier for students to understand the problems presented; makes it easier for students to summarize, transfer material and can increase a high level of focus on learning and student learning outcomes are progressing (Setyarini, 2018).

## Conclusion

The integration of the PBL model with mind mapping has a significant effect on student learning outcomes, it is shown from the results of the t-test statistical test that there is a difference in the average value of learning outcomes between the experimental class and the control class (Sig. 003). The application of the PBL model with mind mapping makes students responsible for learning, namely learning to solve problems and learning to create ideas with concept maps. Solving problems requires students to think so that they can improve cognitive abilities, then the results of thinking are also structured in a structured manner, containing meaningful keywords and symbols, and consisting of various colors in each curved line that is made. Thus, the material is summarized aesthetically so that students can easily understand the learning material and learning outcomes have increased.

**Contributions/Originality**

The integrated of PBL (Problem Based Learning) with mind mapping is important to be applied to students. The student of economic material becomes interesting because it is related to the fulfillment of daily needs, this makes every person try to fulfill these needs by working. Human needs are also tiered and unlimited, besides the things that human needs are very limited. The existense of complex problems that exist in economic activities, students must recognize priorities in meeting needs. It takes hard work and smart work to meet these needs. By applying the PBL model that is applied with mind mapping, students are required to be able to solve problem regarding economic material with their way of thinking, this is mode through writing in the form of concept maps to make the material more concise and simple. Solving problems that are concise and simple will encourage students to think critically and be able to apply the results of solving these problems in their personal lives now and the future.

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