

PROBLEM SOLVING SKILLS THROUGH BRAIN-BASED LEARNING ASSISTED WITH MIND MAP ON NARRATIVE TEXT IN ENGLISH LEARNING

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Abstract:

Problem solving skills are the basis that students must have to help them achieve learning goals. Facts in the field show that problem solving is rarely used as a focus in language learning. After the initial observations were made, the results showed that students in class IX at SMPN 4 Talang Kelapa had low problem solving skills. This study aims to determine the use of the Mind Map-assisted Brain-Based Learning model to improve the problem solving skills of class IX students at SMPN 4 Talang Kelapa in narrative text material. This type of research is Classroom Action Research. The result showed that there was an increase in problem solving skill scores from cycle 1 to cycle 2. The range of scores from cycle 1 was 70,44-79,89. The six indicators tested were in a good category. In cycle 2, the score range for problem solving skills was 81,77-85,22. The six indicators tested were in the very good category. The use of the Mind Map-assisted Brain-Based Learning model in learning English is able to improve students' problem solving skills.

Keywords:

Problem Solving;
BBL;
Mind Mapping.

Received: 13 March 2023

Revised: 17 May 2023

Accepted: 22 May 2023

INTRODUCTION

Education is a systematic process that is planned to create learning that makes students actively experience the development of character and potential for self-control, intelligence, skills, and noble character, so that it is useful for society and the nation. Education in Indonesia is currently dealing with the 21st century era, which has many demands for the development of human resources.

The era of the 21st century is marked by the industrial revolution 4.0, which made it a century of globalization. The 21st century is known as the knowledge age, in this case including efforts to increase skills through habituation in various matters based on knowledge. This explains the importance of developing skills or skills in the 21st century.

The skills that need to be developed to form people who are ready to face the 21st century through the learning process are problem-solving skills. Problem solving shows the complexity of a human's intellectual skills. Students in schools who take part in the learning process must have good problem-solving skills. Good problem solving determines those who have succeeded in reaching the highest level in the learning design taxonomy proposed by Hokanson and Hooper (2004).

There are many opinions regarding problem solving, which is considered as complex learning and which is still difficult to understand. Various problems given to students have different resolution processes and different solutions. These differences can come from the workings of various students' nervous systems. In accordance with the statement of Rahmat et al., 2015, namely problem solving abilities require a special skill and ability possessed by each student, which may differ between students in solving a problem. This makes problem solving skills an important form of learning outcomes in the educational process. Sulasmono (2012) states that problem solving is part of intellectual skills or skills which are assessed as important and significant learning outcomes in the educational process.

Husna and Burais (2018) state that problem solving is a process or activity of thinking to solve the problem at hand. According to Sanjaya (2011), problem solving is defined as a mental and intellectual process in finding problems and solving based on accurate data and information, so that precise and careful conclusions can be drawn. Matlin (1989) states that problem solving is needed when an individual has the desire to achieve a certain goal and that goal has not been achieved. A problem will arise when there is a situation where you are trying to achieve some goal and have to find a way to get there (Schunk, 2012). According to Sulasmono (2012), problem-solving skills are (a) important learning outcomes, (b) and at the same time high-level

learning outcomes, which (c) require a high-level learning process in the learning design taxonomy.

Improving problem solving abilities in students can raise their motivation to identify and provide solutions to various types of problems encountered during the learning process. This ability leads to increased brain activity, which will form the character of a critical thinker in students. Problem solving is important to be nurtured and built in students, because it is considered part of a life-skill that is useful for analyzing concepts and providing responses that were previously impossible to become possible. In accordance with the opinion of Salim and Alnoori (2021), there are several types of abilities in problem solving, namely critical thinking, communication, research, data analysis, and creativity. In many aspects of life, analytical abilities can be used consciously and unconsciously.

Preliminary observation made in Class IX of SMPN 4 Talang Kelapa showed that learning in class was not student-centered. The fact is that most students have not been able to create solutions to the problems encountered and analyze the concepts of the problems encountered from the series of activities that have been carried out. Students did not optimal at collecting various possible data that can help them solve problems. The model used in the learning process is very monotonous, namely discovery learning.

The results of the questionnaire analysis to see students' initial problem solving abilities, namely from the six indicators to measure problem solving adopted by Mourtos et al. (2004) show that the average for problem identification ability is 61,33, information exploration ability is 53,33, the ability to plan solutions is 58,50, the ability to use solutions is 51,50, the ability to check solutions is 56,33, and the ability to evaluate is 49,67. These results show that most of the indicators are still in the poor category, such as the ability to explore information, the ability to plan solutions, use solutions, the ability to check solutions, and the ability to evaluate. Only one indicator is categorized as sufficient, namely problem identification.

Problem solving in learning English has not been considered important to do. By consistently measuring problem solving, other abilities for learning English will also increase. In reality, learning that is carried out to facilitate increasing problem solving skills has not been carried out in the school environment. As stated by Doghonadze and Gorgiladze (2008), until now problem solving has not been widely applied to teaching foreign language lessons.

Learning activities that can improve students' problem solving skills are by applying models that can accommodate the realization of indicators for problem solving. The ideal learning model to be applied to improve problem solving skills is mind map-assisted brain-based learning which will maximize student activity.

Brain-based learning is an interactive learning model that can force students to actively build their knowledge based on the initial knowledge they have. Brain-based learning is based on the way the brain works, so it is hoped that learning can be absorbed more optimally. This model aims to develop the maximum potential of the brain, namely emotional, social, cognitive, physical, and reflective learning systems (Given, 2007). According to Widianita et al. (2017) brain-based learning model, students are required to be able to be active in learning and learning does not only come from the teacher, so that these stages are able to provide a variation in learning. Furthermore, Ramakrishnan and Annakodi (2013) state that the Brain Based Learning model includes three important things in learning, namely learning that makes students related to the material being studied, and this learning makes students active in the process. The brain-based learning model in this study is assisted by the use of media, namely mind maps.

Mind map is a process of mind mapping to connect certain concepts that are poured into interesting writing that resembles a map. So that the concept of learning will be easily understood by the brain. Kustian (2021) states that mind maps can help individuals to be able to place information into a cognitive system and recall it to be used as a basis for knowledge. Swadarma (2013) states that mind map is a technique for utilizing the whole brain by using visual images and other graphic infrastructure to form an impression. The images contained in the mind map are a sign of the success of students in capturing information and communicating the results in front of their friends. Compared to ordinary recording, mind maps help activate cognition, focus and show relationships between separate parts, describe the whole clearly, detail material and transfer information from short-term memory to long-term memory (Putra, 2008). Furthermore, students will easily remember the information they get because they have processed it by making a trajectory of thinking in their brain.

LITERATURE REVIEW

Problem Solving Skills in English Learning

The Partnership for 21st Century Learning (P21) defines problem solving skills as the ability to solve various unfamiliar problems both conventionally and innovatively and recognize and ask questions to clarify different statements and lead to solutions (Aspastur & Sulistyaningrum, 2021). Problem solving requires the application of analytical and evaluation skills to various types of data, statements, beliefs and others, so that students are able to provide solutions to the problems given (Abdullah & Hendon, 2016). Successful problem solvers possess knowledge that is organized and flexible

and transforms this knowledge into practical skills for solving problems (Chi et al., 1982).

Kanokpermpoon (2019) reveals that problem solving skills can be integrated into the English curriculum. Problem solving skills have been applied to teaching tools made by English teachers. The lesson plans and syllabus made include 4C activities including problem solving. Currently, problem solving is one of the critical topics to be applied to the teaching and learning process. Kok and Duman (2023) state that investigating problem solving in learning English is important for realizing a student's character that is ready to be transferred to the real world.

Brain-Based Learning assisted by Mind Map

Measurement of problem solving skills cannot be separated from students' thinking activities. The main component that makes a person able to think is the brain. This makes the Brain-Based Learning model the best choice to maximize students' thinking activities. Brain Based Learning (BBL) is a learning model that prioritizes how the brain works, namely the use of the left brain and right brain must be balanced. The development of BBL is based on the principles of brain-based learning where the brain will understand and remember well when facts and skills are stored naturally (Caine & Caine, 1994). In general, the stages of learning in BBL include (1) pre-exposure, (2) preparation, (3) initiation and acquisition, (4) elaboration, (5) incubation and memory input, (6) verification and checking of beliefs, and (7) celebration and integration (Jensen, 2008).

Mind maps are a way of making creative notes by capturing various thoughts that are carried out in accordance with the natural workings of the two brains synergistically (Windura, 2013). Candra (2015) states that a mind map is something that can be channeled to explore memory, understand, think creatively, analyze a material. Mind maps will hone students' ability to imagine objects to become a single, interconnected unit. Mind maps in the learning process are used as a tool to see the ability of students to connect various concepts to help them solve problems.

RESEARCH METHODOLOGY

Research Design

This type of research is Classroom Action Research. In this research, the model used was proposed by Kurt Lewin. The research model consists of 4 stages namely Planning, Action, Observation, and Reflection in each cycle.

Research Instruments

The instruments used in this study were the Learning Implementation Plan, a problem solving skills questionnaire sheet, a student activity questionnaire sheet based on problem solving skill indicators, as well as observation sheet on the implementation of learning using a mind map-assisted brain-based learning model.

Data Analysis Technique

Data analysis was carried out descriptively. Data analysis was performed on each data collected, in the form of quantitative and qualitative data.

Data Analysis of Problem Solving Skills

The data for measuring problem solving skills was carried out using a questionnaire analysis with a score of 0 to 3. The instrument items for the student questionnaire consisted of 16 statement items, all of which led to indicators of problem solving skills. The questionnaire that will be tested has been analyzed for its validity and reliability. Validation was carried out by research instrument experts. The analysis was carried out by looking for the frequency distribution of the results of the validator's assessment. The criteria used to determine validation categories are described as follows:

Table 1
Instrument Assesment Criteria

| Score Range | Category |
|-------------|------------|
| 34—40 | Very Good |
| 28—33 | Good |
| 21—27 | Sufficient |
| 14—20 | Deficient |
| 8—13 | Very less |

The results obtained that the problem solving questionnaire instrument is categorized as good with a score of 31. This shows that the instrument can be used to retrieve research data. Furthermore, the reliability test is used with Croncbach Alpha namely the instrument is said to be reliable if the value is above 0,60. The results of the reliability analysis show that the instrument to be used is reliable with a value of 0,802.

Problem solving questionnaire data analysis is carried out with the formula:

$$\frac{\text{Student's answer score}}{\text{The number of students}} \times 100$$

The criteria used in this study were adopted by Arikunto (2010), namely:

Table 2
Problem Solving Skills Score

| Problem Solving Skills Score Range | Category |
|---|-----------------|
| 82—100 | Very Good |
| 71—81 | Good |
| 60—70 | Sufficient |
| 49—59 | Deficient |
| < 40 | Very less |

Furthermore, to support the average data on students' problem solving skills, an analysis was carried out on student activity survey sheet based on indicators of problem solving skills in class during the action. The analysis uses a scale of 0 and 1.

Performance Indicator

The final conditions expected after the implementation of the research are: (1) the average problem solving skills of students is ≥ 81 with very good category, and (2) the percentage of student activity questionnaires during the action, in each indicator of problem solving skills was observed a percentage of $> 85\%$.

FINDING AND DISCUSSION

FINDING

Student Problem Solving Skills Before Action

Based on questionnaire analysis data to measure students' problem solving skills before the action, it appears that students' abilities are still in the lower category. Following are the details of the questionnaire analysis data on problem solving skills before the action:

Table 3
Average Scores of Students' Problem Solving Skills Before Action

| No | Problem Solving Indicator | Average Score | Category |
|----|---------------------------|---------------|------------|
| 1 | Problem Identification | 61,33 | Sufficient |
| 2 | Exploration Information | 53,33 | Deficient |
| 3 | Planning Solutions | 58,50 | Deficient |
| 4 | Using Solutions | 51,50 | Deficient |
| 5 | Checking Solutions | 56,33 | Deficient |
| 6 | Evaluation | 49,67 | Deficient |

Based on table 3, it can be seen that the average score of students is categorized as deficient. There is only one indicator which is categorized as sufficient. These results are not suitable to make students able to face various demands in the 21st century era.

Further data analysis was carried out to see the activities of students before the action. This data is used to support data on the results of problem solving skills previously obtained. The results of the analysis of student activity data before the action were 49,73%. This figure showed the low activity of students during the learning process. Based on the results obtained, it is necessary to make improvements to the English learning process to facilitate the improvement of problem solving skills using appropriate models and media.

Student Problem Solving Skills After Cycle 1 Actions

The results of the average score of students' problem solving skills while participating in learning activities were measured on a questionnaire given after the students had participated in all the learning activities. The results of the average score of students' problem solving skills can be observed in table 4 below.

Table 4
Average Score of Students' Problem Solving Skills in Cycle 1

| No | Problem Solving Indicator | Average Score | Category |
|----|---------------------------|---------------|------------|
| 1 | Problem Identification | 79,89 | Good |
| 2 | Exploration Information | 79,55 | Good |
| 3 | Planning Solutions | 74,83 | Good |
| 4 | Using Solutions | 73,50 | Good |
| 5 | Checking Solutions | 70,44 | Sufficient |
| 6 | Evaluation | 73,33 | Good |

Based on table 4, the highest average score of student problem solving skills was 79,89 on the Problem Identification indicator which was categorized as good and one lowest indicator was Checking Solutions with a total average of 70,44 which was categorized as sufficient. Other indicators, namely Information Exploration, Planning Solutions, Using Solutions, and Evaluation are in good category with a total average score ranging from 79,55 to 73,33. Based on the average score of problem solving skills after the first cycle of action, it was seen that there was an increase in students' problem solving skills to be sufficient and good.

Furthermore, data analysis was carried out regarding student activities while participating in cycle 1 learning by filling out a questionnaire on the Google form. The percentage of student activity during cycle I ranged from 87,39%. This showed that the involvement of students in participating in the learning process is categorized as very good, and has exceeded the performance indicators. Even though the percentage of student activity during learning has exceeded the performance indicator, the average score of problem solving skills obtained in cycle I has not reached the performance indicator. Based on these results, it is necessary to hold revisions and planning for cycle 2.

Student Problem Solving Skills After Cycle 2 Actions

Data on students' problem solving skills was measured by filling out a questionnaire on the Google form application. The results of data analysis can be seen in table 5 below.

Table 5
Average Score of Students' Problem Solving Skills in Cycle 2

| No | Problem Solving Indicator | Average Score | Category |
|-----------|----------------------------------|----------------------|-----------------|
| 1 | Problem Identification | 82,67 | Very Good |
| 2 | Exploration Information | 85,22 | Very Good |
| 3 | Planning Solutions | 82,67 | Very Good |
| 4 | Using Solutions | 84,56 | Very Good |
| 5 | Checking Solutions | 84,57 | Very Good |
| 6 | Evaluation | 81,77 | Very Good |

Based on table 5, the highest average problem solving skill score was 85,22 on the Exploration Information indicator which was categorized as very good. Other indicators namely Problem Identification, Planning Solutions, Using Solutions, Checking Solutions, and Evaluation have also been categorized very well with a range of scores ranging from 84,57 to 81,77. Based on the average score obtained after the second cycle of action, it was

seen that there was a better increase in the problem solving skills of students who were previously categorized as good to very good.

Furthermore, data analysis on student activities during cycle 2 was carried out by filling out a questionnaire on the Google form application. The results of the percentage of student activity in cycle 2 which ranged from 93,33%. This showed an increase in student learning activities after participating in cycle 2 with several revisions to the learning process.

The results of data analysis in cycle 2 showed that the problem solving skill indicators tested on students had increased to very good categories with the lowest range of 81,77 to the highest of 85,22. The results of the analysis of student activity during the second cycle of action showed an increase of 93,33%. Based on these results, students' problem solving skills in the class have achieved performance indicators in this study.

DISCUSSION

The situation before the cycle 1 action described that the problem solving skills of class IX students were still very low where out of the 6 indicators tested only 1 was categorized as sufficient while other indicators were categorized as deficient. After the first cycle of action, the 6 problem solving indicators tested experienced an increase in scores and all were categorized as good. The average score of problem solving skills in cycle 1 using a brain-based learning model assisted by a mind map, shows a fairly high increase. These results made students cumulatively improve their problem solving skills after participating in cycle 1 activities. These results are supported by Setyaningtyas and Harun (2020) who have proven that the BBL model is effective for increasing problem solving abilities. Damayanti and Sukestiyarno (2014) proved that by applying a brain-based learning model, students' problem-solving abilities after participating in learning were categorized as high.

Brain-based learning applied in this study forces students to increase their level of thinking in order to find themes, characters, main conflicts, and various other components in narrative text. Furthermore, the use of mind maps as an alternative to discussion results reports is also seen to be more capable of motivating enthusiasm and making it easier for students to map out the stories they are trying to detail the constituent components.

Analysis of student activity during cycle 1 showed an increase of 87,39%. The enthusiasm of students in participating in learning will maximize thinking activities which then lead to the honing of their problem solving skills. The results obtained in cycle 1 showed the effectiveness of the mind map-assisted brain-based learning model used.

Furthermore, the results in cycle 2, there was an increase in students' problem solving skills between cycle I and cycle 2. The results of the data analysis showed that the six indicators of problem solving skills measured during the second cycle of action were categorized as very good. These results are supported by research from Sunaryo and Nuraida (2017), namely the BBL model can effectively improve problem solving skills. Juliantini et al. (2020) have proven that the use of the BBL model in classroom learning shows a significant difference in students' problem-solving skills for the better.

Student activity also increased to 93,33%. Observations of students in cycle 2 were that students were able to follow the learning syntax with enthusiasm, were more confident in expressing the results they got in the form of a mind map in front of other students, were able to discuss narrative story themes that were being discussed during the lesson, and grouped various conflict in the narrative story discussed. Students gave positive responses while participating in learning, resulting in an increase in problem solving skills that were observed during online learning. In cycle 2 students seemed more motivated to perform well and have more intense discussions with study groups in order to be able to determine the theme of the story, and separate the various story conflicts, making the details of the mind map they designed more accurate and interesting.

The increase in student activity leads to the focus of their minds while participating in learning, directs the brain to listen and raises curiosity to start the process of identifying narrative stories. This certainly has an impact on problem solving skills that are well developed. Furthermore, based on the results obtained in cycle 2 it can be concluded that the performance indicators in this study have been achieved.

CONCLUSION

English learning using brain-based learning assisted by mind maps can improve the problem solving skills of Class IX students at SMPN 4 Talang Kelapa for Narrative Text material. Improvement of students' problem solving skills as follows: The average score of students experienced an increase before the action was still in the poor category for most indicators ranging from 49,67 to 61,33, and in cycle 1 it increased to a good category starting from 70,44 to 79,89, in cycle 2 it again experienced an increase so it was categorized as very good starting from 82,77 to 85,22.

ACKNOWLEDGEMENTS

The researcher would like to thank all those who were involved in helping carry out this research, especially SMPN 4 Talang Kelapa. The

researcher would like to express her deepest gratitude to her fellow English teachers who acted as observers and class IX students as samples. May Allah SWT repay your kindness.

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