Application of the problem based learning model to improve critical thinking ability and students science learning outcomes (Fourth Class SDN Inpres 6/84 Welehunian Sagerat)

by Jeane Mangangantung

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Sintia Alce Siongke
Post Graduate Program,
Manado State University,
Indonesia

Philotheus Tuerah
Post Graduate Program,
Manado State University,
Indonesia

JM Mangangantung
Post Graduate Program,
Manado State University,
Indonesia

Corresponding Author:
Sintia Alce Siongke
Post Graduate Program,
Manado State University,
Indonesia

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Sintia Alce Siongke, Philotheus Tuerah and JM Mangangantung

Abstract
The learning process does not only emphasize aspects of remembering knowledge and understanding, but also aspects of application, analysis, evaluation and creativity. This is important because students can train thinking and problem solving as well as the application of concepts in everyday life. Therefore, a model is needed in learning, but in reality teachers are lacking in developing learning models to improve critical thinking and problem solving skills so that learning tends to focus on teacher. This has an impact on the achievement of student learning outcomes. This is evidenced by the number of 33 students only 9 students who succeeded and 24 students have not reached the minimum standard of learning criteria. It is necessary to apply learning that is able to create an active learning atmosphere for students, foster collaboration between students, and train thinking skills so that they can solve problems. The research objectives are to improve critical thinking skills through the use of Problem Based Learning Models, and to improve science learning outcomes for fourth grade students of SDN Inpres Welehunian Sagerat.
The method used in this study is a classroom action research method and is designed in two cycles. The results of the study found that (1) through the application of a problem based learning model in science learning the material properties of light can improve critical thinking skills; (2) through the application of the problem based learning model, it can improve the science learning outcomes of students in the SD Inpres Sagerat class. Suggestions for fourth grade teachers can use problem based learning models in science learning, so that learning becomes more fun and meaningful and students are expected to always be active, creative, think critically, work together in groups and respect each other.

Keywords: Problem based learning, critical thinking, student's science

1. Introduction
Critical thinking skills train students to make decisions from various points of view carefully, thoroughly, and logically. With the ability to think critically, students can consider the opinions of others and be able to express their own opinions. Therefore, learning in schools should train students to explore abilities and skills in searching, processing, and critically assessing various information. To create a conducive and fun learning atmosphere, it is necessary to package an attractive learning model. Students do not feel burdened by the teaching materials that must be mastered. If the student himself searches, processes, and concludes on the problems studied, the knowledge he gets will stick in his mind longer. Teachers as facilitators have the ability to choose effective learning models to improve students' critical thinking skills. With the innovation of the learning model, it is expected to create an active learning atmosphere, facilitate mastery of the material students are more creative in the learning process, are critical in dealing with problems, have social skills and achieve more optimal learning outcomes.
Given the role of natural science as a way to observe the world that is analytical, complete, accurate and connects one phenomenon to another so that the whole forms a new perspective on the object being observed. Learning Natural Sciences can train systematic, logical, critical and creative thinking attitudes, so the selection of learning strategies can encourage students to be active both mentally, physically and socially by prioritizing the involvement of all the senses, feelings, intentions and reasoning of students to be important.

It is hoped that the learning carried out does not merely refer to the transfer of information and knowledge, but can further develop higher-order thinking skills, including critical thinking skills. Science learning should be done through observation and experimentation, not just long theories in the classroom. Through observation and experimentation, students will become active and understand more about the material being taught because they experience it firsthand. It will also foster student curiosity in students and teach them to think critically in dealing with the problems that exist in science lessons.

In order for these efforts to be successful, learning models must be selected that are in accordance with the situation and conditions of students and the learning environment, so that students can be active, interactive and creative in the learning process. The selection of the right learning model will also clarify the concepts provided so that students are always enthusiastic about thinking and playing an active role. The learning objectives will clarify the teaching and learning process in terms of the situations and conditions that must be made in the teaching and learning process.

The learning model used by the teacher should be able to help the student analysis process. One of these models is the Problem Based Learning model. It is expected that the PBL model is better for increasing student activity when compared to the conventional model. The effectiveness of this model is that students are more active in thinking and understanding the material in groups by conducting investigations and inquiries of real problems around them so that they get a deep and more meaningful impression of what they are learning.

The participation of students in the learning process is still lacking, namely only a few students who show active opinion and ask questions. Questions made by students also did not show critical questions related to the material being studied. Then the answers to the questions are still limited to memory and understanding, there is no student attitude that shows an analytical answer to the teacher's questions. That's why science lessons among fourth grade students are still considered a product, namely in the form of a collection of concepts that must be memorized so that it has an impact on the low ability of students in cognitive aspects. The cognitive aspect consists of six aspects, namely remembering, understanding, applying, analyzing, evaluating, and creating. However, in reality, high-level aspects such as analysis, processing problems, evaluating, and creating have not been commonly trained to students. Students still have difficulty in applying the knowledge they have in everyday life. Students are also not used to solving a problem that is preceded by investigation activities. If the principle of problem solving is applied in learning, then students can be trained and get used to thinking critically independently. In addition to students, this problem is also related to teachers, teachers have not been able to guide and improve students' critical thinking skills, due to the lack of teacher preparation in preparing learning implementation plans using learning models. There needs to be careful preparation from the teacher in designing learning so that it can improve critical thinking skills and student learning outcomes.

By applying the PBL model to science learning, it is hoped that students will be able to use and develop critical thinking skills to solve problems using various solving strategies. So that the learning at SDN Inpres 6/84 Walehunian Sagerat, especially class IV, can increase. Because in the observations made, it was found that students with unsatisfactory learning outcomes in the class of 33 students only 9 students who succeeded while 24 students had not succeeded with the average percentage of scores obtained was only 48.4% while the minimum learning completeness standard specified was 75. %.

Based on the problems above, it is necessary to conduct research on "Application of Problem Based Learning Models to Improve Critical Thinking Skills and Science Learning Outcomes for Fourth Grade Students of SDN Inpres 6/84 Walehunian Sagerat"

This research aims to: 1. Improve critical thinking skills of fourth grade students at SDN Inpres 6/84 Walehunian Sagerat through the application of problem based learning models. 2. Improving science learning outcomes for fourth grade students at SDN Inpres 6/84 Walehunian Sagerat through the application of problem based learning models.

2. Literature Review

2.1 Problem Based Learning (PBL)

Based Learning or problem-based learning is a learning model designed to solve the problems presented. According to Arends (2008:41) [2], PBL is a learning model that presents a variety of authentic and meaningful problem situations to students, which can serve as a springboard for investigation and investigation. PBL helps students to develop critical thinking skills and problem solving skills. According to Ni Made (2008:76), the application of the problem-based learning model is intended to increase student participation and learning achievement because through this learning students learn how to use concepts and interaction processes to assess what they know, identify what they want to know, collect information and collaboratively evaluate the hypothesis based on the data that has been collected. According to Trianto (2010: 90) [23], the problem-based learning model is a learning model that is based on the number of problems that require authentic investigations, namely investigations that require real solutions to real problems. Similarly, according to Yatim Riyanto (2009: 288) [26], the Problem Based Learning model is a learning model that can help students to be active and independent in developing problem-solving thinking skills through searching data so that solutions are obtained rationally and authentically.

According to Sanjaya (2006: 214) [24], the main characteristic of the first problem-based learning strategy (SPBM) is a series of learning activities, meaning that students do not only listen to lectures and memorize but focus on student activities in thinking, communicating, processing data, and concluding. Second, learning activities are directed at solving problems. In the learning process, there is a need for the problem to be researched. Third, problem solving is done using a scientific thinking approach. This thinking process is carried out systematically and empirically. According to Made Wina (2009:87) [9], there are three characteristics of problem solving, namely problem solving is a cognitive activity, but is influenced by behavior. Then the results of problem solving can be seen from the actions in finding problems. Furthermore, problem solving is a process of manipulation of previously owned knowledge.

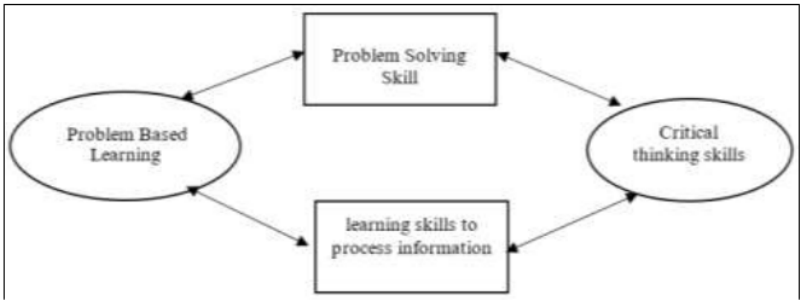
Problem-based learning has clear procedures for involving students to identify problems. John Dewey in Wina Sanjaya

(2006:217) [24], explains 6 steps of problem-based learning strategies which are then called problem solving methods, namely:

a. Formulating the problem, namely the steps of students in determining the problem to be solved.
b. Analyzing the problem, which is a step for students to review the problem critically from various points of view.
c. Formulating hypotheses, namely the steps of students in formulating problem solving based on their knowledge.
d. Collecting data, namely the steps of students to find information in problem solving efforts.
e. In learning based on the problem of the assessment system, it is not enough just to have a written test but is more directed at the results of student investigations.
f. Formulating problem solving recommendations, namely the steps of students describing the formulation of the results of hypothesis testing and the formulation of conclusions.

In learning based on the problem of the assessment system, it is not enough just to have a written test but is more directed at the results of student investigations. The results of the investigation in question are the results of student activities in an effort to solve problems. Assessment and evaluation is carried out by measuring student activities, for example by assessing activities and demonstrating results through presentations. Assessment of activities is taken through observation, then the ability of students to formulate questions, and efforts to create problem solutions.

Problem Based Learning model is closely related to the characteristics of critical thinking skills. The PBL model emphasizes problem solving efforts through investigative activities. This student investigation activity certainly requires information from all sources. Information processing skills are one of the characteristics of critical thinking skills. The relationship between the PBL model and critical thinking skills can be seen in the picture below:



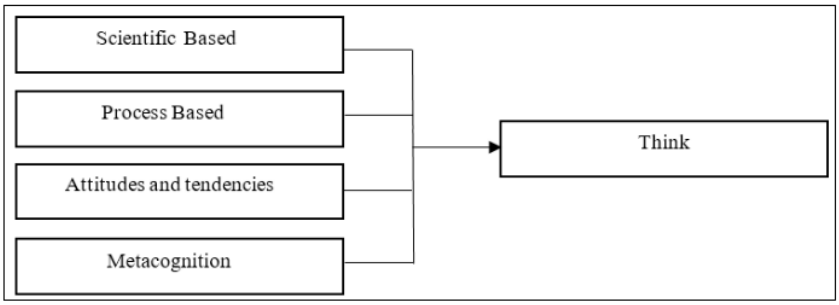
Picture 1: The relationship between the PBL model and critical thinking skills

2.2 Critical Thinking Skills

According to Trianto (2010:95) [23], thinking is the ability to analyze, criticize, and reach conclusions based on inference or careful consideration. According to Isjoni and Arif (2008:164) [9], there are four thinking skills, namely solving problems (problem solving), making decisions (decision making), critical thinking, and creative thinking. It all boils down to higher order thinking skills which include activities such as analysis, synthesis, and evaluation. According to Sanjaya (2006:230) [24], thinking is a person's mental process that is more than just remembering and understanding. Therefore, the ability to think requires the ability to remember and understand. According to Bhisma Murti (2009:1) [3], critical thinking is different from thinking. Critical thinking is an intellectual thought process in which the thinker deliberately evaluates the quality of his thinking. Thinkers use reflective, independent, clear, and rational thinking.

According to Arends (2008:43) [2], problem based learning helps students to develop thinking skills and problem solving skills, learn adult roles, and become independent learners. Likewise, according to Rusman (2010: 236) [15], thinking is used in PBL when students plan, make hypotheses, and express ideas systematically. Problem resolution involves logical and critical analysis, use of analogies, creative integration and synthesis.

Menurut Dede Rosyada (2004:170) [6], kemampuan berpikir kritis (*critical thinking*) adalah menghimpun berbagai informasi lalu membuat sebuah kesimpulan evaluatif dari berbagai informasi tersebut. Inti dari kemampuan berpikir kritis adalah aktif mencari berbagai informasi dan sumber, kemudian informasi tersebut dianalisis dengan pengetahuan dasar yang telah dimiliki peserta didik untuk membuat simpulan. Begitu pula menurut Bhisma Murti (2009:1) [3], berpikir kritis meliputi penggunaan alasan yang logis, mencakup ketrampilan membandingkan, mengklasifikasi, melakukan pengurutan, menghubungkan sebab dan akibat, mendeskripsikan pola, membuat analogi, menyusun rangkaian, peramalan, perencanaan, perumusan hipotesis, dan penyampaian kritik. Menurut Ratna Yuniar (2010:89) [14], berpikir kritis merupakan keterampilan berpikir yang melibatkan proses kognitif dan mengajak siswa untuk berpikir reflektif terhadap permasalahan. The flow of critical thinking development, according to Kauchak in Dede Rosyada (2004: 170) [6], can be seen in Figure 2.2



Picture 2: Flow of critical thinking development

Critical thinking procedures can be developed to create critical thinking formulations, as formulated by Kauchak in Dede Rosyada (2004:173) [6].

Table 3: Critical thinking procedures

No	Action	Process
1	Observation	
2	Formulation of various choice patterns and generalizations	Compare and classify
3	Formulation of conclusions based on patterns that have been developed	Conclusion, predict, hypothesize, identify cases and their effects
4	Evaluating conclusions based on facts	Support conclusions with data, observe consistency, identify biases, stereotypes, repetition, and raise various assumptions that have never been formulated, understand the possibility of generalizations that are too large or small, and identify relevant and irrelevant information.

According to Bhisma Murti (2009:1) [3], the characteristics of critical thinking are as follows:

1. Critical thinking requires efforts to analyze knowledge and make conclusions based on supporting information and data.
2. Critical thinking requires the ability to predict, predict, recognize information, distinguish between facts, theories, opinions, and beliefs.
3. Critical thinking requires the ability to recognize problems and find solutions to overcome these problems by gathering information and assessing knowledge and conclusions.
4. Critical thinking is also related to good and clear language skills, being able to interpret data, assessing evidence and arguments, and being able to recognize whether or not there is a logical relationship between one assumption and another.
5. Critical thinking trains the ability to draw conclusions and test conclusions, reconstruct patterns of beliefs held based on broader experience, and make accurate judgments about specific things in everyday life.

2.3 ience learning outcomes

In the implementation of the teaching and learning process in the classroom, it will always end with an evaluation of learning outcomes. Learning outcomes are often equated with student achievement. In the formulation of the national education system, both curricular and instructional objectives, learning outcomes are divided into three domains, namely: cognitive, affective, and psychomotor. To be able to determine whether or not the goals of education and teaching are achieved, it is necessary to make an effort or act of assessment. Romizoswki (in Anitah, 2007:2.19) mentions in the scheme of abilities that can show learning outcomes, namely: 1) cognitive skills related to the ability to make decisions, solve problems and think logically; 2) psychomotor skills related to the ability of physical actions and perceptual activities; 3) reactive skills related to attitudes, wisdom, feelings, and self-control; 4) interactive skills related to social and leadership skills. Gagne (in Anitah, 2007: 2.19) states that there are five types learning outcomes that can be achieved by students: 1) motor skills; 2) verbal information; 3) intelle l skills; 4) attitudes; and 5) cognitive strategies. The realization of learning outcomes will always be related to learning evaluation activities so that there is a need for learning evaluation techniques and procedures that can effectively assess learning processes and outcomes.

Science or what is called IPA (Natural Science) in terms of terms means the science of natural knowledge. "Science" which means a true knowledge, in the sense of knowledge that is justified according to the benchmark of the truth of science, namely rational (reasonable / logical) and objective (according to the object, according to reality, according to the experience of sensory observation). While "knowledge" means everything that is known by humans. So in short, science or science is a rational and objective knowledge about the universe and all its conte .

Zainal (2002: 41) states that learning is a structured combination, including human elements, materials, facilities, equipment, and processes that influence each other to achieve learning objectives. A learning system has three main characteristics, namely having a special plan, interdependence between its elements, and goals to be achieved.

A learning will be successful if there is a harmonious teaching and learning process. John S. Richardson, an exp in science teaching, suggests the use of seven principles in the teaching and learning process so that a science teaching can be successful. The seven principles are: 1) the principle

of active student involvement; 2) the principle of continuous learning; 3) the principle of motivation; 4) multi-channel principle; 5) the principle of invention; 6) the principle of totality; 7) the principle of individual differences (Darmodjo *et al*, 1991/1992: 12).

According to Piaget in Darmodjo *et al*, 1991/1992: children's thoughts and behavior are always based on the level of children's intellectual development. For elementary school age children in the level of children's intellectual development, including in the concrete operational stage, namely the age of 7-11 years, where children think on the basis of concrete/real experiences. They have not been able to think abstractly such as imagining the process of photosynthesis or osmosis events or theories about atoms and molecules. A child's ability to think a little abstractly is always preceded by concrete experiences, for example, to make a classification, still in the sense of understanding only the outer shape or making observations, for example on colors, long-large shapes.

At the end of this stage the child has been able to understand about analysis (separating) and synthesis (combining). They are also able to write and correspond, and finally they can begin to think simple abstract, for example understanding the concepts of weight, force, and space. In teaching science, what must be remembered is that concrete operational children still really need concrete objects to help develop their intellectual abilities.

Research Method

This study aims to improve critical thinking skills and student learning outcomes in science learning. So the design of this research is classroom action research. This classroom action research was conducted in a collaborative and participatory manner. This means that this research was not carried out alone but in collaboration with the fourth grade teacher of SDN Inpres 6/84 Walehunian Sagerat. Researchers are involved in collaboration with teachers in planning, implementation as observers, observations, and reflections. Researchers as observers of the learning process. CAR, according to Suharsimi (2006:74), consists of four activities carried out in a repeating cycle. There are four main activities in each cycle, namely (a) planning, (b) implementation of actions, (c) observation, and (d) reflection.

This research was conducted at SDN Inpres 6/84 Walehunian Sagerat which is located at Sagerat Weru 1 Village, Matuari District, Bitung City. The time of the research was carried out in the odd semester from 7 to 19 October 2019 for 4 meetings. This research will stop when there has been an increase in critical thinking skills and students' science learning outcomes in cycle one and cycle two. Data collection techniques are methods that can be used by researchers to collect data. In this study there are 3 kinds of data collected in different ways. 1. Learning Implementation Data with the PBL Model.Data on the implementation of learning was obtained through documentation in the form of observation sheets on the implementation of learning with the PBL model, questionnaires at the end of the cycle, and photos of learning activities.2. Critical Thinking Ability Data. 3. Data on learning outcomes.

The research instruments used in this study were 1. Learning Implementation Observation Sheet with PBL Model, 2. Critical Thinking Ability Analysis Sheet based on LKPD, 3. Pre-test and post-test sheets, 4. Questionnaire. The data obtained in this study were in the form of observational data on learning activities, analysis of critical thinking skills, pre-test and post-test results, and questionnaires. The critical thinking ability analysis data was obtained from the results of the LKPD which had been adjusted to the scores of each critical thinking indicator. Score details are attached. The data from the critical thinking ability analysis sheet and pre-test post-test data that have been analyzed are then presented as a percentage. Thus it can be seen the extent of the improvement obtained in learning. The results of data analysis are then presented in a scale.

The indicator of the success of this research is an increase in critical thinking skills and science learning outcomes for fourth grade students of SDN Inpres 6/84 Walehunian Sagerat on the material properties of light after applying the Problem Based Learning model. Increased critical thinking skills and learning outcomes occur if there is a change from the criteria enough to be good or must reach the minimum learning criteria classically by 75%, it can be interpreted that most students are able to follow five phases in learning with problem based learning models so that they can process information easily. well, students have mastered three indicators of critical thinking skills in dealing with a problem, and students are able to answer post-test questions with complete scores. So based on the data collection from the results of the research such as observing the application of problem based learning models, analysis of critical thinking skills based on LKPD, pre-test-post-test questions, and questionnaires from cycle I to cycle II if there has been an increase from quite to good. Thus the research can be stopped because it has been successful.

4. Result and discussion

4.1 Use of Problem Based Learning Learning Model

In the first cycle, not all of the PBL model learning steps were implemented. From several observations of implementation at the problem orientation stage, the teacher's activities in motivating students to be actively involved in learning have not been seen. Then at the stage of organizing students, the teacher's activities in setting the use of time have not been optimal, so that it appears in the first cycle, the time for the teacher to confirm the results of the presentation of students is not long. At the stage of guiding students' investigations, the teacher is also aware that the activities of seeking students to be actively involved and interact with each other have not been optimally carried out. This is because the PBL model is a new learning model so it needs to be adjusted to class conditions.

Entering the second cycle, there is an improvement from the implementation of the first cycle, it appears that the results achieved by students also increase from every aspect of learning in critical thinking and science learning outcomes. In the implementation of the second cycle of learning, the learning stages of the PBL model have all been carried out. The problem orientation stage in activities to motivate students to be actively involved has been carried out. Setting the use of time has also been made, in this case the teacher gives discussion time for 20 minutes, which is shorter than cycle I. This is done so that the time for presentations is earlier and the time for the teacher to clarify the results of the presentation is also longer. The next stage is to guide the investigation of students, the teacher's activities in seeking students to be actively involved and interact with each other

have been carried out. This can be seen when the teacher asks again the problems contained in the LKPD and gives classical questions. This question is intended to stimulate the extent of students' knowledge in recognizing the problems given. Students who know, immediately raise their hands and express opinions. In this case, the teacher does not immediately justify the students' answers, but gives other students the opportunity to complete the answers. From this activity, teachers and students are active in learning, thinking about problems, causes of problems, designing solutions to making final conclusions.

4.2. Critical Thinking Ability Improvement

The following is a comparison chart of each critical thinking indicator in cycle I and cycle II, so that it can be seen that the students' critical thinking skills are increasing.

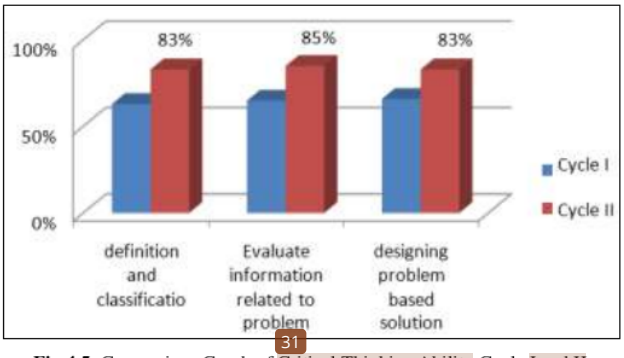


Fig 4.5: Comparison Graph of Critical Thinking Ability Cycle I and II

In the indicator of definition and clarification of problems in the first cycle, students reached an average percentage of 63%, this percentage is categorized as sufficient. Then in the second cycle it rose to 83% which was categorized in good criteria. Furthermore, the indicator of the ability to assess information related to the problem of the first cycle of students reached 65%, which means that it is categorized in sufficient criteria. Then in the second cycle it increased to 85% which means it is included in the good criteria. The third indicator of designing a solution based on the problem of the first cycle of students reached 66%, which means it is also categorized in the sufficient criteria. Then entering the second cycle, it increased to 83% which was included in the good assessment criteria. This can be interpreted that there is an increase in students' critical thinking skills in dealing with a science problem.

4.3 Use of Problem Based Learning Learning Model

The following is a comparison graph of the increase in pre-test and post-test in cycle I and cycle II, so that the increase in science learning outcomes can be seen.

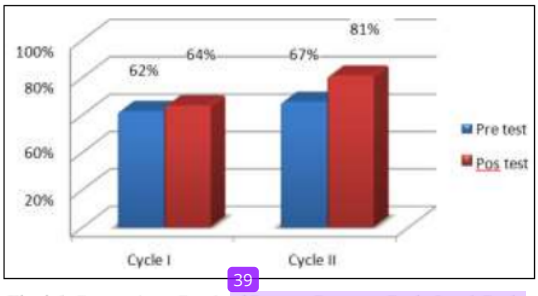


Fig 4.6: Comparison Graph of Pre test Post test Cycle I and Cycle II

Based on the data obtained, there was an increase in the results of pre-test and post-test from cycle I to cycle II. The first cycle pre test showed a percentage of 62% then in the second cycle it rose to 64%. The assessment criteria for the pretest are still adequate, namely sufficient. The first cycle post test showed a percentage of 67% then in the second cycle it rose to 81%. There is an increase in the assessment criteria which was originally sufficient to become good.

4.4 Questionnaire of students' responses to science learning using the PBL Model

Based on the analysis of student responses in the interest category, it reached 85%, which indicates that this PBL model is well received by students. Researchers make positive and negative statements, all of which lead to student interest in the learning being carried out. The next category is attitude. The analysis carried out shows that the percentage of student responses is 83%. This result is also included in the good criteria. Researchers make 4 statements that lead to students' attitudes towards learning. The next analysis of student responses is the skill category which reaches a percentage of 82%. This result is also included in the good assessment criteria. In the skill category, the researcher made 4 statements, both positive and negative. Through the PBL model, students' skills can be increased. In PBL, there are several stages, namely problem orientation, organizing, investigating investigations, presenting discussion results, and evaluating problem solving.

The next response analysis is the level of understanding of students in the application of the PBL model, which reaches a percentage of 81%. This result is included in the good assessment criteria. In this category, the researcher made 7 positive and negative statements. The results of the cycle carried out also showed an increase in students' understanding of the concepts of the material being studied.

The steps of students in solving problems require the right information. Therefore, students are trained to be more active in learning to find accurate sources. Students are trained to find new ideas in order to find solutions to problems.

Based on the results of the research in the second cycle, there were 81% of students who had achieved the indicators

of success, therefore this research could be stopped until the second cycle and not continued, but there were still 19% of students who had not completed, therefore enrichment/remedial could be done. in the form of assignments such as practices, products, projects.

Conclusion

Based on the results of research and discussion, it can be concluded as follows

1. Through the application of the problem based learning model in science learning the material properties of light can improve the critical thinking skills of fourth grade students of SDN Inpres 6/84 Walehunian Sagerat. The increase in each of the critical thinking indicators, among others, indicators of problem definition and clarification from adequate to good at 83%, then indicators assessing information based on the problem of the assessment criteria increased from sufficient to good by 85%, and the indicator of designing solutions based on the problem of the assessment criteria increased from enough to good by 83%.
2. Through the application of the problem based learning model in science learning the material properties of light can improve the learning outcomes of fourth grade students at SDN Inpres 6/84 Walehunian Sagerat. The improvement can be seen from the results of pre-test and post-test from cycle I to cycle II. The pre-test in the first cycle showed a percentage of 33% then increased in the second cycle to 64% and the post-test in the first cycle showed a percentage of 67% then in the second cycle it rose to 81%. There is an increase in the assessment criteria which was originally quite good.

6. References

1. Abdullah, Aly, Eny Rahma. Ilmu Alamiah Dasar. Jakarta: Bumi Aksara 2001.
2. Arends Richard. Learning to Teach. Penerjemah: Helly Prajitno & Sri Mulyani. New York: McGraw Hill Company 2008.
3. Bhisma Murti. Berpikir Kritis (Critical Thinking). Seri Kuliah Budaya Ilmiah. Fakultas Kedokteran Universitas Sebelas Maret. Diakses dari alamat http://researchengenis.com. pada tanggal 3 Maret 2019 2009.
4. Buchari Alma. Guru Profesional Menguasai Metode dan Terampil Mengajar. Bandung: Alfabeta 2008.
5. Daniel Dike. Peningkatan Kemampuan Berpikir Kritis Siswa dengan Model TASC (Thinking Actively in a Social Context) pada Pembelajaran IPA. Jurnal Penelitian. Hlm. 2010, 15-29.
6. Dede Rosyada. Paradigma Pendidikan Demokratis Sebuah Modal Masyarakat dalam Penyelenggaraan Pendidikan. Jakarta: Prenada Media 2004.
7. Hamzah B, Uno DKK. Desain Pembelajaran. Bandung: Publishing 2010.
8. Herawati Susilo. Pendidikan MIPA Tingkat Dasar dan Menengah Era Globalisasi di Filipina. Prosiding, Seminar Nasional. Yogyakarta: FMIPA UNY 2000.
9. Isjoni, Arif Ismail. Model-Model Pembelajaran Mutakhir. Yogyakarta: Pustaka Pelajar 2008.
10. Jogiyanto. Pembelajaran Metode Kasus. Yogyakarta: Andi 2006.
11. Made Wina. Strategi Pembelajaran Inovatif Kontemporer. Jakarta: Bumi Aksara 2009.
12. Martinis Yamin, Bansu Ansari. Taktik Mengembangkan Kemampuan Individual Siswa. Jakarta: Gaung Persada Press 2009.
13. Nana Sudjana. Penilaian Hasil Proses Belajar Mengajar. Bandung: PT Remaja Rosdakarya 2000.
14. Ratna Yuniar. Keterampilan Berpikir Kritis. Diakses dari alamat 2010. http://fisikasma-online.blogspot.com/2019/12/keterampilan-berpikir-kritis.html. pada tanggal 2 Februari 2019.
15. Rusman. Model- model Pembelajaran Mengembangkan Profesionalisme Guru. Jakarta: Rajawali Press 2010.
16. Shahram, Yazdani. Learning Theories 2002. Diakses dari alamat http: http:
17. //cmap.upb.edu.co/rid=1155658100609_1605921141_13667/learning%20t heorie. ppt. pada tanggal 20 Maret 2019.
18. Sugihartono *et al*. Psikologi Pendidikan. Yogyakarta: UNY Press. Suharsimi 2007,
19. Arikunto, Suhardjono, Supardi. Penelitian Tindakan Kelas. Jakarta: Bumi Aksara 2006.
20. Sumaji DKK. Pendidikan Sains yang Humanistik. Yogyakarta: Kanisius 2008.
21. Suparwoto. Sains dan Kajian Filsafat. Yogyakarta: FMIPA UNY 2011.
22. Trianto. Mendesain Model Pembelajaran Inovatif-Progresif. Jakarta: Kencana Prenada Media Group 2009.
23. Trianto. Model Pembelajaran Terpadu. Jakarta: Bumi Aksara 2010.
24. Wina Sanjaya. Strategi Pembelajaran Berorientasi Standar Proses Pendidikan. Jakarta: Kencana Prenada Media Group 2006.
25. Wonorabardjo Surjani. Dasar- Dasar Sains. Jakarta: Indeks 2010.
26. Yatim Riyanto. Paradigma Baru Pembelajaran. Jakarta: Kencana Prenada 2009.

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