Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILIWANGI BANDUNG

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 10, Number. 2, October 2024

Grow children's curiosity in science activities through the problem based learning model

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Article Info

Article history:

Received September 05, 2024
Revised September 21 , 2024
Received October 22 , 2024

Keywords:

Curiosity
Learning model
Problem Based Learning
Science for Early Childhood
Science Learning

Abstract

Problem based learning model (PBL) has been implemented in the learning process in PAUD. The application of PBL in learning activities is carried out to develop children's abilities in identifying and finding solutions to problems that children are facing, such as in science play activities. One of the problems that occurs is related to the development of curiosity , especially those related to the ability to analyze and develop initiatives to describe problems faced by children when playing. This study was conducted to determine the extent to which the use of PBL learning models based on science activities can be used to develop the curiosity of children aged 4- 5 years in Kindergarten 'LSUPI' totaling 30 children. Data collection was carried out by using triangulation techniques in the form of observation, interviews and documentation studies , resulting in qualitative descriptive analysis techniques in the form of percentages and explanations . As a result, it is known that the application of the learning model PBL based on science activities is a tool for children to encourage and grow 8 indicators of curiosity when carrying out learning activities.

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INTRODUCTION

Based on Government Regulation No. 19 of 2005 concerning National Education Standards, Article 19 paragraph 1 states that the learning process in educational units is carried out interactively, inspiringly, fun, challenging, motivating students to actively participate and providing sufficient space for initiative, creativity and independence in accordance with the talents, interests and physical and psychological development of students (PP concerning National Education Standards, 2005). The learning process can be maximized to be given to children if supported by an approach that is in accordance with the needs and interests of children. Early childhood learning is a process of interaction between children, parents, or other adults in an environment to achieve developmental tasks. The interaction that is built is a factor that influences the achievement of learning objectives to be achieved. This is because the interaction reflects a relationship between children so that children gain meaningful experiences, and the intended learning process can take place in accordance with the goals to be achieved. There are several forms of learning models that can support this learning process, one of which is the problem-based learning model . *This problem- based* learning model is a learning model that confronts children with learning challenges in learning to gain meaning and understanding, so that children are able to take the initiative in solving the challenges or problems that exist in the learning (Riyanto, 2010). ; Amir, 2009). The problem for which a solution is sought is then used to link the child's curiosity and analytical and initiative abilities to the learning that will be obtained later.

The learning model is a conceptual framework in the form of a learning plan that describes a systematic procedure used as a guideline in classroom learning (Joyce, 2009; Hamalik, 2003; Udin, 1997). The term learning model has four special characteristics, namely: 1) logical theoretical rationale compiled by the creators, 2) the basis for thinking about what and how students learn, 3) teaching behavior needed for the model to be successful, 4) the learning environment needed for the learning objectives to be achieved (Zahro, 2015; Sanjaya, 2006). Each learning model always has a closing stage. However, there are differences such as differences in the management of the learning environment, differences in the role of students, differences in the role of teachers, differences in physical space and differences in the social system of the class. These differences must be understood by teachers in implementing the learning model so that it can be implemented properly.

Problem based learning is a learning model that is set in the form of learning that begins with a problem using an instructor as metacognitive training and ends with presentation and analysis from the child (Ernawati , et al., 2021; Abdurrozak , et al., 2016). The *problem based learning model* is based on cognitive psychology, so the focus of teaching is not so much on what students are doing, but on what they are thinking about when they do the activity. In problem based learning, the role of the teacher is more as a guide and facilitator so that students learn to think and solve their own problems (Ibrahim, 2000).

Important characteristics in the *problem-based learning model* are as follows (Setyawan , 2021; Siti, 2019); 1. Learning objectives, designed to be able to stimulate and involve learners in problem-solving patterns. This condition will be able to develop learning skills in their fields directly in identifying problems; 2. Sustainability of the problem, In this case there are two things that must be met. First, it must be able to bring up concepts or principles that are relevant to the content domain being discussed. Second, the problem should be real so that it allows for a common view between children; 3. There is a presentation of the problem, children are involved in presenting the problem so that they feel they have the problem. There are two main things in presenting the problem. First, if students are involved in authentic problem solving, then they must have the problem. Second, is that the data displayed in the problem presentation does not highlight the main factors in the problem, but can be displayed as a basis for questions so that it does not display key information; 4. The role of teachers as tutors and facilitators, In this case the role of teachers as facilitators is a role that can develop children's creative thinking in the form of expertise in problem solving and helping children to become independent. The ability of tutors as facilitators of small group teaching skills and learning processes is the main determinant of quality and success (Sontani , 2016 ; Anindtya , 2014).

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In several studies it was concluded that the *problem based learning model* given in the form of science activities can help children develop basic skills, such as a sense of responsibility, the ability to work together and train children's independence. However, it has not been found that the PBL learning model through science activities can be associated with the development of children's curiosity, especially for children aged 5-6 years.

Basic skills such as curiosity in children need to be fostered and developed from an early age, because this curiosity will... become a stepping stone for children to know many things related to all forms of learning obtained in the teaching and learning process. In addition, curiosity is divided into 8 indicators, namely 1). Skills in asking teachers and friends about learning themes, 2). Finding other sources related to the theme yourself, 3). Telling or discussing natural phenomena or learning that has just occurred, 4). Enthusiastic in seeking answers, 5). Attention to the object being observed, 6). Asking about each step of the activity, 7). Demonstrating listening, expressing, reading and writing skills through scribbles or writing, 8). Listening to the teacher's explanation related to the material earnestly can be traced in the child to be developed. So that curiosity can be the initial foundation of skills for children when they face or encounter a problem that requires an answer or solution.

Referring to the things that have been stated above, this is what then becomes the basis for carrying out learning practices using the *problem based learning model.* through science activities in group B of TK "LPUPI". Through *collaborative action research* conducted between researchers and class teachers in this study , it is expected to describe things related to how the *problem based* learning model is implemented through science activities. carried out in learning can help develop a sense of curiosity in children.

METHOD

The research method used in this study is a study that uses a qualitative approach, namely the use of *collaborative action research. Collaborative action research* in the traditional view is a problem-solving research framework, where there is collaboration between researchers and clients in achieving goals (Kurt Lewin , 1973 cited Sulaksana , 2004). In this study, the researcher collaborated on joint actions with the teacher, so that the division of tasks between researchers was carried out, the researcher as the action analyst and the teacher as the action taker. The research was conducted for 4 months, namely in August-November 2023 at the "LPUPI" Kindergarten. The research subjects used in this study were children in group B at the "LPUPI" Kindergarten, precisely in Groups B1 and B2 with children's ages ranging from 5-6 years, with the number of children involved in the learning process when we were observing was 30 people, 14 boys and 16 girls.

Data analysis in this study uses qualitative descriptive analysis techniques, from the results of the qualitative analysis, the researcher adjusts it with percentage calculations and then enters it into five predicate categories, namely as follows:

Table 1. Predicate Categories for Children's Curiosity

No.	Interval	Category
1.	81-100%	Very good
2.	61-80%	Good
3.	41-60%	Enough
4.	21-40%	Not good
5.	0-20%	Not good

The descriptive qualitative data analysis in this study was also used to interpret the data by comparing the results before and after the action. This data analysis was carried out during the reflection stage. The results of the analysis in the form of predicates are then used as reflection material for further planning in the next cycle.

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RESULTS AND DISCUSSION

Results

The steps for implementing the PBL learning model through science activities carried out in this study are described as follows:

In terms of compiling the steps for implementing the PBL learning model, the researcher tries to describe in detail what we do, such as knowing whether what we are going to do has been arranged when we make a learning plan, describing what we get and find, how the implementation of this PBL learning model is going, what has been achieved after PBL is carried out, and up to the reflection notes on learning activities using the problem-based learning model that we do at "LPUPI" Kindergarten. Therefore, the discussion in this section begins with what is done in the planning section, what is done in the implementation, what is done in the observation and what is done in the reflection, as seen below :

1. Planning

results obtained from planning activities include:

a. Developing a complete research plan with a Daily Learning Implementation Plan (RPPH) that will be implemented using the *Problem Based Learning method* . The researcher plans more intensive activities such as consulting with class teachers and principals about preparing for implementing learning using the *Problem Based Learning method* through science activities. The planning is carried out through interview activities, which are transcribed as follows:

Table 2. Results of interviews with teachers regarding the preparation of RPPH with the PBL model through Science Activities

No.	Question	Response to the statement submitted
1.	What learning themes will be associated with the science activities provided?	**Mrs. An** = ' *The theme for this month 's learning activities is 'animals', it seems like animals will be more interesting if given to children, because this is the theme. the closest to the child to learn* '. **Mother S** = *'Yes, this animal seems suitable, but more like a water animal, because there are many types, shapes and sizes'.*
2.	How are science activities combined in the learning themes that will be discussed?	**Mrs. S** = *We first arrange what science activities are appropriate for us to raise in discussing the topic of aquatic animals or marine animals. For example, we will first prepare a lesson plan that focuses on this 'Sea Animal Diorama', we will make dioramas with the topic of marine animals together with the children so that every time this science activity is carried out, the dioramas will be used.*

b. Determining the implementation time, which concerns the day and date of observation.
c. Developing a checking format related to the *Problem Based Learning* learning model through science activities
d. Fellow teachers who are asked to observe learning are encouraged to provide training on this learning model by:
   1) Planning learning materials and formulating objectives. Determining learning materials, by adjusting to the applicable syllabus and explaining it well enough.
   2) Selecting and organizing materials, media, and learning resources.
   3) Designing learning scenarios. Learning scenarios are adjusted to the objectives, materials and development levels of students, variations are attempted in delivery. The structure and steps of

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learning have been adjusted to the objectives, materials, development levels of students, available time, the systematic is to put children in a central position, and adjust to the *Problem Based Learning learning model* through science activities.

2. Implementation
   a. Class Management
      Manage the class with thorough preparation, teach the material correctly according to the *Problem Based Learning learning model* through science activities.
   b. Appearance
      In general, the observer is neatly dressed, uses polite language, guides students as much as possible using the *Problem Based Learning method* , starting with conveying what will be done, continuing with the delivery of material about "Aquatic Animals (Sea Animals)" .
   c. Better management of space, time and learning facilities.
      In managing classroom space, time and learning facilities, what the observer must do is provide learning aids/media.

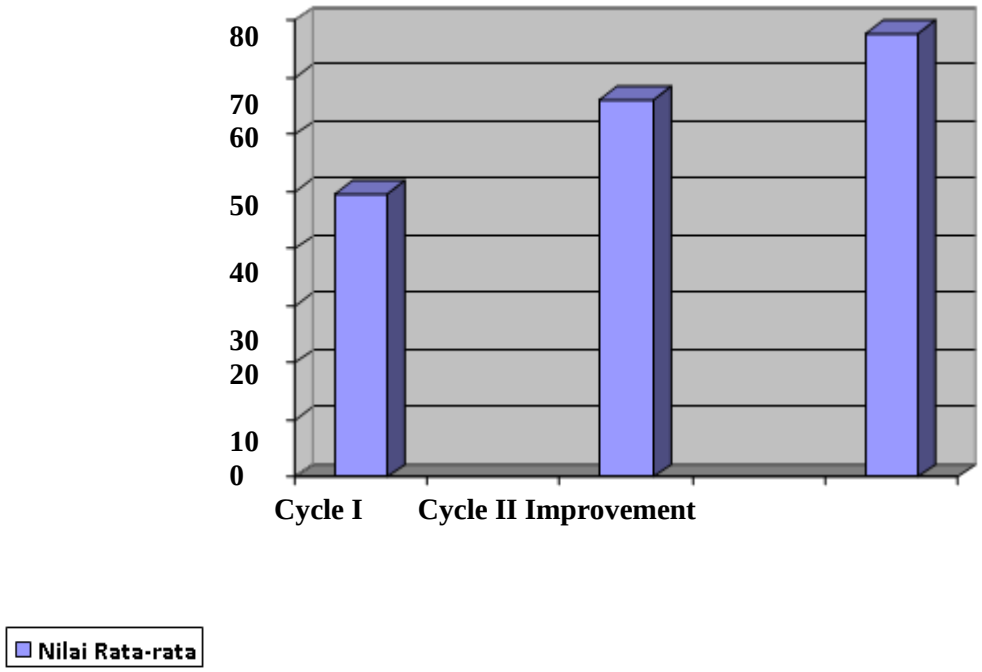
3. Observation

The term observation is derived from Latin which means “to see” and “to pay attention”. The term observation is directed at the activity of paying attention accurately, recording the phenomena that appear, and considering the relationship between aspects in the phenomenon.

In this learning, our observations were made while the entire learning series was taking place. Starting from preparation to enter learning, learning activities and the evaluation process (recalling together between teachers and children) in learning.

Observers record events/incidents that occur, especially if they find notes related to the *problem-based learning method* through this science activity in the learning that occurs.

Figure 1. Chart 8 Indicators of Children's Curiosity



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4. Discussion

From the observation results, it was conveyed that from what the teacher had done in following the steps of the problem-based learning process, many things were found related to children's curiosity. What the researcher and teacher (collaboration) did when teaching and observing children in groups B1 and B2 of TK 'LPUPI' in Bandung City, was based on the steps of the problem-based learning process , namely as follows:

a. The first step of defining *the problem* , when the teacher delivers the material (conditions in the sea, animals in the sea) not all of the teacher explains. The teacher only provokes students' knowledge a little, so that they are more active and can interact by mentioning what students already know.
b. The second step of self-learning , the teacher only helps to arouse students' curiosity by provoking children's knowledge. By showing the fish he has brought as a teaching aid.
c. The third step of the investigation stage, students seek and develop understanding that is relevant to the problems that have been discussed. In Kindergarten students, seek and develop their knowledge by asking or telling stories to parents and teachers.
d. The fourth step of exchange, After getting the source for their knowledge needs, students discuss in their groups to clarify their achievements and formulate solutions to group problems. In Kindergarten students, students who already understand more and understand more provide explanations to friends who do not understand.
e. The final step of the assessment, the assessment is carried out by combining three aspects of knowledge , skills , and attitudes . Assessment of knowledge mastery that covers all learning activities carried out.

Table 3 . Indicators and Percentage of Curiosity Achieved by Children

No	Curiosity Indicator	Number of children From the Whole	Percentage (%)
1	Ask teachers and friends about learning themes	24	80
2	Look for other sources related to the theme yourself,	17	56.67
3	Telling or discussing natural phenomena or learning that has just occurred,	26	86.67
4	Enthusiastic in search of answers,	14	46.67
5	Attention to the object being observed,	25	83.4
6	Asking about each step of the activity,	27	90
7	Demonstrate listening, expressing, reading and writing skills through scribbles or writing,	24	80
8	Listen to the teacher's explanation regarding the material seriously	25	83.4
Average		22.75	75.85

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Discussion

During the learning process using the problem-based learning method , children can do this learning while playing, children divide themselves into small groups to do this learning. Group division is done to facilitate learning to be more relevant for children to do, so that the findings that want to be obtained in this learning process can be channeled or raised from the ideas or understanding of each child. Because this learning method is very suitable for science learning, all learning activities related to creating opportunities for curiosity (which is a scientific attitude) can also be done in this learning process. In this activity, children can also start to think about what objects, animals, plants are in the ocean, what color the sea water is, large and small aquatic animals, even to the description of bubbles (as a sign that fish, or other aquatic animals can breathe in water/sea), this is a concept in the concrete life process (which can help develop their curiosity directly and naturally), because during learning in the classroom children often learn to look at books without being able to recognize what is actually around them directly. This is also inseparable from the child's thinking to move up to elementary school (SD), because to move up to elementary school children in kindergarten (especially children in group B) must have a way of thinking to solve problems with things they find. Not only that, this problem-based learning can be applied to the home environment of children's daily lives. This problem-based learning can also hone children's thinking.

At the beginning of the implementation, it was seen that 8 children had not shown 8 indicators related to curiosity about learning activities using science activities carried out by the teacher , they looked confused when they were going to do the activities provided and could not find a solution when the child found difficulty while working on this activity, in this case the child was seen arguing which eventually became a fight with his friend because of differences of opinion that could not be united to work on activities in his group. Seeing this, the teacher immediately took action so that the child would start doing this activity even a little (the teacher as a facilitator).

From the results of the observations that have been described above, curiosity through problem based learning in science activities carried out in the group of children aged 5-6 years in class B1 and B2 of "LPUPI" Kindergarten. There are children who show feelings, interest, attention and involvement in learning which initially decreased, changed into enthusiasm, showed their interest in trying to do the available learning activities, raised curiosity, and children can cooperate well with their respective study groups well. At the end of the learning, children also looked happy and enthusiastic in carrying out problem based learning activities through this science activity. From the results of the discussion, it is known that after the action was carried out, children's curiosity grew with a good percentage , namely with an average percentage of 75.85 percent of the 8 indicators of curiosity that children showed in the learning process. Through these results, it can be said that learning activities using the PB learning method through this science activity can help and improve 8 indicators of children's curiosity in learning activities, namely 1). Skills of asking teachers and friends about learning themes, 2). Finding other sources related to the theme, 3). Telling or discussing natural phenomena or learning that has just occurred, 4). Enthusiastic in seeking answers, 5). Attention to the observed object, 6). Asking about each step of the activity,
7). Demonstrate listening, expressing, reading and writing skills through scribbles or writing, 8). Listen to the teacher's explanation regarding the material seriously .

These results are in line with Dewey's opinion which states that the PBL learning method through science activities can attract children's attention and focus in learning activities, so that children will discover new knowledge themselves (Sugiyanto, 2010).

Example of *a Lesson Plan* (Learning Plan) that was carried out

Semester/Month/Week	: I (one)/November/3
Day/Date	: Tuesday, November 15 , 2023
Group/Age	: B/5-6 Years (Dragonfly Class)
Theme/Sub Theme	: Animals/Water Animals

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(Fish, Turtles, Starfish, Seahorses and Crabs)

ACTIVITY NAME : 'Ocean Blue'
DESCRIPTION :
The teacher invites children to get to know and understand what aquatic animals live in the sea and the conditions in the sea.
ACTIVITY OBJECTIVES: (described according to PBL steps)

1. Children can mention (characteristics of sea animals, names of animals that live in the sea, colors and shapes).
2. Children can describe the conditions (situations) in the sea.
3. Children can retell stories about sea conditions that they have heard through art & craft activities (diorama).
4. Can arouse curiosity in children.

TOOLS AND MATERIALS :

1. Pictures of various sea animals.
2. Pictures of marine objects (seaweed).
3. A3 paper.
4. Glue.
5. Crayons.

PROCEDURE:

1. The teacher divides the children into several small groups (3-4 children), by giving the children colored paper and forming groups with children who get the same colored paper.
2. The teacher distributes pictures of sea animals, sea objects, glue, and A3 paper on each group table.
3. Children stick pictures of sea animals (fish, turtles, starfish, etc.), sea objects (seaweed), on A3 paper and color the parts that are not filled with the picture stickers.

ASSESSMENT :

1. Teachers can find out the abilities that have been achieved by children through observation, where the assessment results will be described in the form of descriptions.
2. Teachers see the science values (products, processes and attitudes) that emerge during learning activities.

CONCLUSION

Based on the results of observations and also the discussions presented, it was concluded that the *problem based learning model* through science activities can increase curiosity in learning carried out by children in class B1 and B2 of TK "LPUPI". The development of this curiosity can be seen in the graph of the results of observation data, interviews and documentation studies obtained, starting from the planning stage of the learning process to the end of learning, which was carried out for approximately 16 meetings during the research implementation period in the field for approximately 4 months and 2 months of data transcription process.

Learning using the *problem based learning method* can increase positive responses related to children's curiosity by making children more focused and enthusiastic to try something that children find in learning using science activities. From the science activities arranged in this PBL learning model, it is also known that children's curiosity is increasing, this can be seen from the enthusiasm of children to experiment by providing responses to the science activities given, so that children look very active and express their joy when doing this learning .

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ACKNOWLEDGMENTS

Gratitude is expressed to the parties who have helped the researcher to complete the research and writing of this scientific paper, fellow lecturers of the PG PAUD Study Program IKIP Siliwangi , fellow postgraduate students of the PAUD Study Program, Universitas Pendidikan Indonesia, Kindergarten used as a place of research and all parties that the researcher cannot mention one by one. As the saying goes 'there is no ivory that is not cracked' **,** then without the help of related parties, the researcher cannot complete the writing of this scientific paper in accordance with the provisions.

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