



Project-Based Learning Model Improves Ability to Understand Environmental Cleanliness in Early Childhood

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ABSTRAK

Pemahaman akan kebersihan lingkungan merupakan salah satu unsur penting dalam pencapaian pembelajaran anak usia dini terkait dengan pembiasaan perilaku hidup bersih dan sehat (PHBS) yang merupakan salah satu elemen penilaian perkembangan anak usia dini yakni elemen jati diri pada implementasi kurikulum merdeka. Penelitian ini bertujuan untuk menganalisis model pembelajaran berbasis proyek terhadap kemampuan memahami kebersihan lingkungan pada anak usia 5-6 tahun di Taman Kanak-Kanak. Jenis penelitian ini yaitu kuantitatif. Metode eksperimen dengan desain one group pretest- posttest digunakan pada penelitian ini. Sampel berjumlah 38 orang anak. Teknik pengumpulan data melalui observasi dengan instrumen penilaian. Teknik analisis data menggunakan analisis deskriptif kualitatif, kuantitatif dan statistik inferensial. Hasil penelitian yaitu model pembelajaran berbasis proyek berpengaruh signifikan terhadap kemampuan memahami kebersihan lingkungan pada anak usia dini dengan menciptakan interaksi yang berkualitas antara guru dan anak serta meningkatkan kemampuan berpikir (Higher Order Thinking Skills- HOTS). Kemampuan memahami kebersihan berkaitan dengan Pola Hidup Bersih Sehat (PHBS) yang dikumpulkan meliputi; kemampuan anak dalam memahami kebersihan kamar/toilet/jamban; tidak buang sampah sembarangan; memahami perlindungan diri dari jentik nyamuk, pentingnya menanam pohon dalam menciptakan udara bersih; dan kebersihan selokan di sekitar lingkungan anak.

ABSTRACT

An understanding of environmental cleanliness is an important element in achieving early childhood learning related to the habituation of clean and healthy living behavior (PHBS), one of the elements of early childhood development assessment, namely the element of identity in the implementation of the independent curriculum. This study aims to analyze the project-based learning model on the ability to understand environmental hygiene in children aged 5-6 years in Kindergarten. This type of research is quantitative. The experimental method with a one-group pretest-posttest design was used in this study. The sample is 38 children. Data collection techniques through observation with assessment instruments. Data analysis techniques using descriptive qualitative analysis, quantitative and inferential statistics. The study results are that the project-based learning model significantly affects the ability to understand environmental hygiene in early childhood by creating quality interactions between teachers and children and increasing thinking skills (Higher Order Thinking Skills- HOTS). The ability to understand is included in HOTS, while data on the ability to understand cleanliness related to Clean Healthy Lifestyle (PHBS) collected include; the child's ability to understand the cleanliness of the room/toilet/latrine; do not litter; understand self-protection from mosquito larvae, the importance of planting trees in creating clean air; and cleanliness of the gutters around the child's environment.

1. INTRODUCTION

A positive identity is essential for a child to carry out daily activities optimally (Helista et al., 2021). Children can recognize, understand and appreciate their needs and surroundings through a positive

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identity. One of the characteristics of children who already have a positive identity is when the child shows clean and healthy living behaviour (PHBS). PHBS is believed to be a form of behaviour based on awareness of learning outcomes that are used as a form of assistance to oneself and others to realize the health of the surrounding environment (Anhusadar & Islamiyah, 2021; Ariani & Riza, 2019; Ayu et al., 2018). The PHBS activities are related to awareness of environmental hygiene owned by children, namely maintaining the cleanliness of the toilet/bathroom, not littering, avoiding mosquito larvae and maintaining a clean environment at school and home.

Realizing a clean environment is the ideal of the State of Indonesia, but the implementation of PHBS still needs special attention. According to a survey comparing the performance of environmental hygiene awareness in rural communities, reaching 22.9% and 42.3% in urban communities (Ariani & Riza, 2019), efforts are still needed to influence public awareness of environmental cleanliness. Furthermore, data from several studies state that the city of Samarinda, located in the province of East Kalimantan, Indonesia, has environmental pollution problems related to the increasing waste production (Agustina et al., 2020; Rehas, A. M., & Pasaribu, 2017; Setiawan et al., 2020). As a result, this city often experiences natural disasters (floods), which have an impact on the people in the city. Other effects caused by this situation are impaired cognitive development that is less than optimal and raises psychosocial problems such as sleep disturbances, eating disorders, depression, anxiety and pessimistic views of the environment. An effort is needed to make someone aware of the ability to understand environmental cleanliness must be applied from an early age; this is a form of appreciation and stimulation of an individual on cognitive development to lead him to the formation of an individual who has higher order thinking skills (Higher Order Thinking) (Ayu et al., 2018; Yuwanto et al., 2018; Zakiah, 2021).

Providing education from an early age will lead children to have more lasting thinking skills and can affect their development and well-being in the future (Ardoin & Bowersb, 2020; Essa & Burnham, 2019; Garca et al., 2020). This argument is evidenced in the golden age (early age), when children's brain development and absorption develop rapidly (Gilmore et al., 2018; Putri & Suparno, 2020; Richardson et al., 2018). Improving thinking skills is closely related to higher thinking skills (HOTS). HOTS is a framework for thinking in every learning activity to increase children's thinking skills to become more complex (Norton & Nurnberger-Haag, 2018). There are several categories of thinking ability levels in HOTS, including the ability to remember, understand, apply, analyze, evaluate and create. Each of these categories has an achievement of abilities that can be designed and applied in activities in Kindergarten. The ability to understand the cleanliness of the environment that is owned by children is the goal of this research, this will be achieved by providing stimulation to activities of critical thinking, creative and problem solving. The achievement of the ability that is focused as a goal is that children can tell, give examples and display activities related to environmental cleanliness.

One of the efforts to optimize the ability to understand the cleanliness of the environment in Kindergarten certainly requires selecting a suitable learning model. Several studies have stated that the accuracy of the selection and application of learning models will affect the success of education (Octavia, 2020; Ponidi et al., 2021). This success is due to educators' and students' steps, rules, and roles in applying the model (Joyce et al., 2015; Putri & Suparno, 2020). Project Based Learning (PjBL) is one of the influential learning models to create quality interactions between educators and students and can affect the improvement of thinking (Chu et al., 2017; Maros et al., 2021). This learning model includes a form of constructivism, namely children's understanding built by ideas, questions and hypotheses proposed and discussion activities with group friends during the activity (Krajcik & Blumenfeld, 2012). The constructivism approach in early childhood is adapted to the stages of thinking; for example, kindergarten-age children are in the pre-operational stage (2-7 years). At this stage, the child represents the surrounding environment with words and pictures (symbolic/physical thinking) (Babakr et al., 2019); therefore, any activities given to children should not be abstract. In addition, Piaget, the originator of the early childhood thinking stage, believes that children actively develop cognitive abilities through information received from the management of stages and maturity of thinking schemes, including assimilation, accommodation and equilibration processes (Miller et al., 1970; Santrock, 2019). In addition, Vygotsky believes that the social environment is involved in facilitating and providing assistance according to need (scaffolding) (Margolis, 2020).

Several studies have stated that the PjBL model has proven effective and influential in developing children's social and emotional abilities, such as children becoming more cooperative and communicative in learning activities (Farida & Rasyid, 2019; Ningrum et al., 2022). In addition, this learning model also affects children's motor development (Royati, 2021). Still, there is a lack of completeness of available information related to the influence of the PjBL model on every aspect of early childhood development (Farida & Rasyid, 2019). There are problems with aspects of cognitive development, namely the ability to understand environmental hygiene and the need for information on the effect of implementing the PjBL

model in all aspects of child development. Therefore, this study will look at the impact of the PjBL model on the ability to understand environmental hygiene in early childhood related to aspects of cognitive development, especially in Kindergarten.

2. METHOD

A pre-experimental research design in the form of One Group Pretest-Posttest Design was used in this research. This design was applied to determine the effect of the PjBL model on the ability to understand environmental hygiene in early childhood. The subjects of this study were 38 children aged 5-6 years in Kindergarten who were given treatment and did not have a control class. The observation focused on the PjBL treatment for the ability to understand the cleanliness of the child's environment.

The subjects in this study were all children in group B (5-6 years) in TK X East Kalimantan. The kindergarten selection was based on the suitability of the program owned by TK X Samarinda to the research topic, namely the environmental hygiene program. Several characteristics make TK X chosen as research subjects, including 1) children in TK B are children in the early age range, and 2) TK X Samarinda has never applied the PjBL model in learning. Informed consent from the head of the institution and teachers at TK X was obtained in this study regarding the selection of research subjects [Table 1](#).

Table 1. Description of Research Subjects

| Gender | Quantity |
|--------------|-----------|
| Boy | 16 |
| Female | 22 |
| Total | 38 |

There are two stages in implementing this research, including the preparation stage. This research was carried out in two stages, namely, the preparation stage and the implementation stage. The details of the planning stages start from observing children in group B TK X Samarinda, which aims to obtain information on making research plans. Then, the researchers validate instruments such as daily learning implementation plans (RPPH) and rubrics for assessing the ability to understand cleanliness (assessment questionnaire). Furthermore, the researchers carried out the implementation phase, including the first and second stages. The first stage in implementing this research was conducted in 2 meetings to determine the child's initial ability to understand environmental hygiene before implementing the PjBL model. After knowing the child's initial ability, the researcher continued in the second stage to obtain data on the same ability by implementing the PjBL model; this meeting was held three times. PjBL Steps in Kindergarten showed in [Table 2](#). Instruments for assessing the ability to understand environmental cleanliness showed in [Table 3](#). Criteria for assessing the ability to understand environmental cleanliness showed in [Table 4](#).

Table 2. PjBL Steps in Kindergarten

| PjBL Steps | Description |
|------------|--|
| Pertama | The teacher gives orientation to children about environmental problems |
| Kedua | children are allowed to ask questions about environmental problems that have been told |
| Ketiga | children conduct an investigation or exploration of environmental problems around the Kindergarten institution |
| Keempat | After they finished exploring, the children started to form small groups to discuss how to do environmental hygiene projects |
| Kelima | children in groups determine and carry out the environmental hygiene projects |
| Keenam | children presented the results of the environmental hygiene project they had made |
| Ketujuh | children presented the results of the environmental hygiene project they had made |

(Adopted from Rahardjo et al., 2022)

Table 3. Instruments for Assessing the Ability to Understand Environmental Cleanliness

| Indicator | Sub Indicators | Item |
|---|-----------------|---|
| Ability to understand environmental hygiene | Telling | Children are able to tell about the cleanliness of the toilet |
| | | Children are able to tell the behaviour of throwing garbage in its place |
| | | Children are able to tell the characteristics of clean air |
| | Give an example | Children are able to tell about the cleanliness of the sewers in the environment |
| | | Children are able to model the cleanliness of the toilet |
| | | Children are able to model the behaviour of throwing garbage in its place |
| | | Children are able to give an example of planting trees as an activity to create clean air |
| | | Children are able to exemplify the cleanliness of the sewers in the environment |
| | | Children are able to show the cleanliness of the toilet |
| | Showing | Children are able to display the behaviour of throwing garbage in its place |
| | | Children are able to display tree planting activities as an activity to create clean air |
| | | Children are able to display the cleanliness of the sewers in the environment |

(Adopted from Rahardjo et al., 2022)

Table 4. Criteria for Assessing the Ability to Understand Environmental Cleanliness

| Scoring Criteria (1-4) | Information |
|------------------------|---|
| 4 BSB | When the child is able to do it independently and is able to help his friend who has not reached the ability according to the expected indicators |
| 3 BSH | When the child is able to do it independently and consistently without having to be reminded or imitated by the teacher/parent |
| 2 MB | If the child does it, they still have to be reminded or assisted by the teacher or parent |
| 1 BB | If the child does it, they must be guided or exemplified by the teacher/parent |

(Modified from Permendikbud nomor 146 Tahun 2014)

Furthermore, an inferential statistical technique was used to test the research hypothesis, where the paired-sample t-test was performed after the Kolmogorov-Smirnov normality test was performed. Overall data analysis was carried out with the help of the Statistical Package for Social Sciences (SPSS) version 22.0 program.

3. RESULTS AND DISCUSSION

Result

Based on the results of the researchers' observations in the implementation phase I, students were taught using the Project Based Learning (Pre-PjBL) or pretest model and then were taught using the Project Based Learning (Post-PjBL) or post-test model. Then the average score of the ability to understand environmental cleanliness is obtained, described in Table 5.

Table 5. The Average Value of the Ability to Understand Environmental Cleanliness

| Rubric Score Ability to Understand Environmental Cleanliness | Pretest | Post-test |
|--|-------------------|---------------|
| Maximum Score | 2,3 | 4 |
| Minimum Score | 1 | 2 |
| Average | 1,68 | 3,05 |
| Category | Not enough | Enough |

The average rubric score on the ability to understand environmental cleanliness in [Table 6](#) indicates an increase in the ability to understand environmental cleanliness after students are taught to use the Project Based Learning model, which is 3.05. The results of the inferential analysis through the normality test conducted to test the normality of the skill rubric data before and after the use of the Project Based Learning learning model, the researchers conducted the Kolmogorov-Smirnov test with the SPSS (Statistical Package for Social Sciences) program at a significance level of = 0.05. The results of the normality test in [Table 6](#).

Table 6. Kolmogorov Smirnov’s Normality Test Results

| | Kolmogorov-Smirnov ^a | | |
|----------|---------------------------------|----|------|
| | Statistic | df | Sig. |
| Pretest | .138 | 38 | 0,65 |
| Posttest | .136 | 38 | 0,72 |

The Kolmogorov-Smirnov test determines that the data is normally distributed if the significance value is higher than 0,05; if the significance value is lower than 0,05, the sample is not normally distributed. With the pretest value, Sig. = 0,65 is higher than P-value (0,05), where $0,65 > 0,05$. Thus the pretest data is normally distributed. As for the post-test value, where the significance value = 0,72 is higher than the P-value, or Sig. $0,72 > 0,05$, indicating the post-test value is also normally distributed.

After the data was statistically normally distributed, the researcher conducted a t-test (t-test) or paired-sample t-test with the condition that if the p-value > (0.05), then H_0 was accepted, and H_1 was rejected. Conversely, if the p-value < (0,05), then H_0 is rejected, and H_1 is accepted. The results of the hypothesis test on the ability to understand environmental cleanliness showed in [Table 7](#).

Table 7. Results of Paired-Samples T-test

| Condition | N | Mean | SD | df | t | Sig. |
|-----------|----|------|-------|----|---------|-------|
| Pretest | 38 | 1,68 | 0,468 | 37 | -12,016 | 0,000 |
| Posttest | 38 | 3,04 | 0,577 | 37 | | |

[Table 7](#) of the paired-sample t-test shows that the significance value obtained is $0.000 < 0.05$ or Sig. < then H_0 is rejected, and H_1 is accepted. These results indicate a significant influence of using the Project Based Learning model on the ability to understand environmental hygiene. This substantial result is also supported by obtaining an average rubric score for the ability to understand environmental cleanliness; it can be seen that there is an increase in the ability to understand environmental cleanliness from the poor category (M = 1.68) to the sufficient category (M = 3.05). In other words, a significance value of 0.000 and an increase in the average value before and after learning Project Based Learning demonstrates that Project Based Learning has a significant positive effect on the ability of students to understand environmental cleanliness.

Applying the project-based learning model positively influences the ability to understand environmental cleanliness. Through this learning model, children become more active in learning activities; through the learning steps, children can tell, give examples and display environmental hygiene activities. Supporting the results of this study, the project-based learning model makes children active in learning activities and has cohesiveness and increased self-confidence ([Aksela & Haatainen, 2019](#)). This learning model has several effects on childhood education, including increasing children’s social development ([Farida & Rasyid, 2019](#)) and motor development ([Ningrum et al., 2022](#)) and significantly influencing children’s visual skills. Following the environmental hygiene problems that occurred in Samarinda, selecting project-based learning models can be one of the suitable learning models to stimulate aspects of children’s cognitive development in understanding abilities. The results of this study demonstrate that project-based learning positively influences aspects of cognitive development in understanding environmental hygiene problems. However, further research is still needed on applying the model to a broader subject so that the effectiveness of the learning model can be tested and trusted to be used.

Discussion

The effect of the project-based learning model on children’s ability to understand environmental cleanliness in this study shows that the project-based learning model can be applied as an alternative to stimulate children's understanding abilities and to promote clean and healthy living habits (PHBS) as an element of the implementation of the independent curriculum. Children of age 4-5 years in this study could

comprehend and imitate the pre-described behaviours of PHBS. The children improved their cognitive and psychomotor towards clean and healthy living.

First, children can tell about the activities they are doing related to environmental hygiene in the application of syntax project-based learning models, such as telling about activities/conditions of toilets that are clean and comfortable to use; the behaviour of disposing of trash in its place; State the characteristics of clean air with benefits for the body and how to clean gutters. This behaviour is possible for children to imitate because the learning model empowers students to learn in a realistic and contextual problem-solving environment. The results obtained are in line with several studies which state that the application of the PjBL model must follow the syntax so that learning objectives can be achieved and bring students from class to real-life experiences (Aksela & Haatainen, 2019; Hayati & Syaikh, 2020; Wulandani et al., 2022). Furthermore, storytelling activities during the application of the model also help children build more complex vocabulary to increase children's understanding of what they see and say (Lestari, 2018; Rizqiyani & Azizah, 2018). Each child's activity during the pretest led them to mature understanding abilities compared to the project-based learning model before it was implemented. This result is supported by previous findings where interesting story characters help young students understand and imitate certain behaviours rather than just instructing students (Nurmahmudah et al., 2018; Pangestuti, 2021).

Second, in project-based learning activities, the children make simple projects such as making small nets to clean waterways due to their thinking about understanding environmental cleanliness. In line with this, PjBL brings children to activities to solve their daily problems (Amelia & Aisya, 2021; Pasaribu & Simatupang, 2020), complementary to cleaning toilets and making plastic/garbage bags from nets which they then decorate. In addition, the children displayed their projects according to the PHBS indicators very well. When children can provide examples based on their experiences, it proves that they have a critical self-concept and solve problems that allow them to be in higher order thinking skills (HOTS) (Afrianti & Marlina, 2021; Dewi et al., 2019; Sala-Sebastià et al., 2022). Project-based learning can improve students' problem-solving abilities if the teacher designs the model appropriately based on the context and characteristics of students (Tholib & Rugaiyah, 2022).

These positive results might be related to the efficacy of project-based learning as the model allows learners to engage in a meaningful learning experience and help them to develop crucial capabilities such as gaining new knowledge, skills and disposition (Krauss & Boss, 2013). Teachers' role is crucial to successfully implementing project-based learning (Imban, 2021). Teachers with sufficient understanding of healthy and clean living behaviour learning materials determine whether the children understand the concepts. Moreover, teachers in early childhood education commonly have close bonds with their pupils, enabling effective communication and motivation to behave in a clean and healthy lifestyle (Anhusadar & Islamiyah, 2021; Ayu et al., 2018; Nurmahmudah et al., 2018). Additionally, this fruitful result might derive from the children's parents whose educational background and literacy of clean and healthy living behaviour are sufficient. It is argued that lack of information, income, educational background and prior knowledge determine children's understanding and behaviours of a clean and healthy lifestyle (Kusumawardani & Saputri, 2020). Thus, parents, the environment and school are vital to support the practice of clean and healthy living behaviours because children tend to imitate what they see and hear from their surroundings (Ananda et al., 2022).

Moreover, previous relevant studies incorporating project-based learning to foster learners' understanding and behaviour towards cleanliness of the environment consistently demonstrated that the model is adequate to enhance cognitive and affective domain (Sopiani et al., 2019) and to inculcate characters (Rifmasari et al., 2022). In this study, project-based learning puts learners into circumstances where they can practice the behaviour, which enhance the understanding of clean and healthy live behaviour concept. AS et al. (2021) noted that direct practice after cognitive activities contributes to learners' understanding about the concept because they directly involve in real-life activities under the teacher's guidance.

The activities carried out by the children in this study were related to the learning theory put forward by leading educational figures, including; 1) Jean Piaget, the ability to understand environmental cleanliness affects the ability to occur due to information processing carried out by children such as assimilation, accommodation and equilibration (Santrock, 2019). The process of assimilation refers to entering new information into one's cognitive structure. Second is the adjustment process, namely adjusting new information with the prior acquired information. Third, equilibration is the adjustment of information from the process of assimilation and comfort. The formation of this knowledge is achieved by constructing the knowledge that children have through their experiences, as well as their activities in seeking and obtaining information, which means actions that support the formation of knowledge with the activities they carry out in everyday life; 2) Lev Vygotsky, the project-based learning model is carried out with the help and direction of the teacher in carrying out each activity on the ability to understand environmental

cleanliness in the form of directions or instructions on each implementation of learning syntax can improve cognitive abilities so that children have the cognitive abilities that children have. The Zone of Proximal Development (ZPD) illustrates this, where children's abilities can develop better if there is interaction with more mature or understanding people (Sanrock, 2019).

The present study has demonstrated that project-based learning can enhance children's understanding and provide a meaningful experience to practice the behaviours of clean and healthy live behaviour. However, it is vital that the sample size and certain activities might be considered in implementing project-based learning to gain an in-depth understanding of the model's effect towards the understanding of environmental hygiene or cleanliness. Thus, future studies might need to be conducted on a larger sample by considering more activities commonly used in early childhood education, such as workshops, demonstrations, direct practice, and using songs (Masykuroh, 2020). Also, collecting necessary information from parents to understand how clean and healthy live behaviour at home might support a robust claim and better understanding of learners' behaviour. Moreover, the design of this study did not allow for comparison to different groups due to the absence of control groups which limited the claim of the model's effectiveness to a different context.

4. CONCLUSION

Based on the results of this research, it is concluded that the project-based learning (PjBL) model is valid and can positively influence the ability to understand environmental cleanliness. Some changes that occurred were as follows: children were able to tell, give examples and display environmental hygiene activities such as toilet cleanliness, tree planting activities as a form of creating clean air, throwing garbage in its place and cleaning sewers in its environment.

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