



DEVELOPMENT OF EARLY CHILDHOOD CREATIVITY WITH PHYSICAL MOTOR SKILLS USING PROJECT-BASED LEARNING AT CEMARA LILIBA KINDERGARTEN

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Author Information

Orvinanto Sabнено

orvinantojeifanka@gmail.com

Institut Agama Kristen Negeri Kupang

Adriana Lape

Lapeadriana52@gmail.com

Institut Agama Kristen Negeri Kupang

Fenti Bani

fentiyeifridabani@gmail.com

Institut Agama Kristen Negeri Kupang

Yuni Hano

yunihano5@gmail.com

Institut Agama Kristen Negeri Kupang

Maria Fahik

mfahik544@gmail.com

Institut Agama Kristen Negeri Kupang

Defrin Waang

densiwaang@gmail.com

Institut Agama Kristen Negeri Kupang

Author Correspondence.

Name: Orvinanto Sabнено

Email:orvinantojeifanka@gmail.com

Phone:

Fredericksen Victoranto Amseke

dedyamseke@iaknkupang.ac.id

Institut Agama Kristen Negeri Kupang

Abstract

Background: Creativity is a fundamental aspect of early childhood development because it supports children's ability to generate ideas, solve problems, and express themselves through meaningful learning experiences. However, empirical evidence regarding the implementation of Project-Based Learning using an ex post facto design in authentic early childhood classroom settings remains limited. **Objective:** This study aimed to examine the effect of Project-Based Learning on the creativity development of children aged 5–6 years at Cemara Liliba Kindergarten. **Method:** A quantitative approach with an ex post facto design was employed involving 20 children selected through purposive sampling. Data were collected using Project-Based Learning and creativity instruments based on relevant theoretical indicators and analyzed using descriptive statistics and simple linear regression. **Results:** The findings revealed that Project-Based Learning had a positive and significant effect on children's creativity development, with an R Square value of 0.304, indicating a contribution of 30.4%. The implementation of mindful, meaningful, and joyful learning activities also supported children's active engagement during project-based learning. **Novelty:** This study provides empirical evidence of the effectiveness of Project-Based Learning in enhancing early childhood creativity through an ex post facto design in an authentic classroom context. **Conclusion:** Consistent implementation of Project-Based Learning can effectively foster children's creativity and provide practical guidance for teachers in designing meaningful, child-centered learning experiences.

Keywords: Project-Based Learning; Creativity Development; Early Childhood; Ex Post Facto; Kindergarten.

INTRODUCTION

Early childhood education (PAUD) is the foundation of the national education system, specifically designed to facilitate children's development during the golden age, a critical period that determines future learning and developmental outcomes. Early childhood, ranging from birth to six years of age, is characterized by rapid growth in physical, cognitive, language, social-emotional, and creative development. During this stage, children possess high curiosity, rich imagination, and an exceptional capacity to absorb information from their surrounding environment. According to Suryana (2020) *"Early childhood is an individual who is undergoing a very fundamental process of growth and development, where the foundations of physical, cognitive, language, social-emotional, and creative abilities are formed and developed significantly during this time."* Therefore, providing appropriate educational stimulation during this period is essential to ensure that every aspect of children's development can be optimized. One of the developmental domains that deserves particular attention is creativity, as it serves as an important foundation for children's future learning, innovation, and problem-solving abilities.

Creativity is a fundamental ability that encompasses fluency of thinking, flexibility, originality, and the capacity to elaborate ideas into meaningful and useful products or actions. In early childhood education, creativity is not limited to artistic expression but also includes children's ability to explore, imagine, solve problems, and express ideas in unique ways during daily learning activities. Hasanah (2021) stated that *"Creativity is the ability of individuals to generate new ideas or ideas, find new relationships between various things, and create works or ways of thinking that are original, adaptive, and useful for themselves and their environment."* Consequently, creativity should be continuously stimulated through meaningful learning experiences because inadequate stimulation during early childhood may hinder children's creative potential in later developmental stages.

One of the important developmental domains closely related to creativity is physical-motor development, which includes gross motor skills, fine motor skills, body coordination, and movement control. Through physical-motor activities, children not only learn to control their body movements but also develop imagination, confidence, communication skills, and creative thinking while interacting with their environment. Rahmawati and Kurniawati (2022) stated that, *"Physical development and movement ability are the main foundations for the development of children's cognitive, social-emotional, and creative abilities, because through movement activities, children begin to get to know the world, communicate, and channel encouragement which is the basis for the development of creative ideas."* This indicates that meaningful physical activities provide opportunities for children to explore new ideas, experiment with different movement patterns, and construct creative experiences through direct interaction with their surroundings.

The learning method considered most appropriate for integrating physical-motor activities with creativity development is Project-Based Learning (PjBL). This approach engages children in meaningful projects that require them to plan, implement, and present products or activities based on

themes that are relevant to their interests and daily experiences. Wulandari (2023) explained that, *"Project-based learning is a child-centered learning approach, where students carry out investigation, planning, and problem-solving activities independently or in groups to produce real products or works that are useful and meaningful for them."* Through this approach, children are encouraged to become active participants in the learning process, while teachers function as facilitators who guide exploration, collaboration, and creativity rather than merely transmitting knowledge.

In physical-motor learning, the Project-Based Learning method can be implemented through various meaningful activities, such as designing obstacle courses, creating animal movements, developing traditional games, or performing self-created musical movements. During these activities, children are encouraged to discuss, plan, collaborate, and demonstrate movement ideas based on their own imagination. Suparno (2022) stated that, *"The main advantage of project-based learning is that it provides the widest possible opportunity for students to develop their potential, including creativity, through exploration, hands-on experience, and problem-solving."* These characteristics are highly consistent with the principles of early childhood education, which emphasize learning through play, direct experience, and active exploration. As a result, physical-motor activities become not only opportunities for movement practice but also meaningful experiences that stimulate children's creative thinking and self-expression.

Several previous studies have demonstrated the effectiveness of Project-Based Learning in improving various aspects of early childhood development. Anggraini (2022) reported that Project-Based Learning encourages children to generate original ideas through planning and decision-making activities. Likewise, Mashud (2024) emphasized that integrating physical and mental activities in project-based learning enables children to develop creativity more comprehensively. Sari and Wijayanti (2023) also found that children who actively participate in creating products experience more meaningful learning because they are involved throughout the entire learning process, from planning to presenting the final product. These studies consistently indicate that Project-Based Learning promotes children's creativity through active participation, collaboration, and authentic learning experiences.

However, despite the growing evidence regarding the benefits of Project-Based Learning, previous studies have primarily focused on cognitive achievement, product-based learning outcomes, or general creativity development. Limited studies have specifically examined the implementation of Project-Based Learning through physical-motor activities using an ex post facto design in authentic early childhood classroom settings. Furthermore, few studies have explored how children's creativity develops through project-based physical activities that encourage movement, imagination, and problem-solving simultaneously. This limitation highlights the need for further investigation in different educational contexts to strengthen the empirical evidence regarding the effectiveness of Project-Based Learning in fostering early childhood creativity.

It is important to understand that creativity in early childhood does not emerge automatically but develops through appropriate learning experiences and a supportive environment. A learning environment that promotes creativity provides children with opportunities to explore, experiment, make decisions, and express their ideas freely without fear of making mistakes. Pratiwi (2020) stated that, *"Creativity will flourish if children are given the freedom to choose, act, and express themselves, and are supported by adults who act as facilitators rather than rigid regulators."* Therefore, teachers play a crucial role in designing meaningful learning experiences that integrate physical activities with opportunities for exploration, imagination, and creative expression.

The relationship between physical-motor development and creativity is closely associated with children's cognitive growth and brain development. Every movement performed by children stimulates neural connections that support thinking, problem-solving, and creative abilities. Kurniawan (2021) stated that, *"Diverse and well-planned physical activities increase oxygen supply to the brain, strengthen neural connections, and significantly influence children's thinking, problem-solving, and creativity."* Consequently, physical-motor activities that require children to explore, design, and create movement patterns are expected to provide richer learning experiences than activities that merely involve imitating the teacher's movements.

Another important strength of the Project-Based Learning method is its ability to connect learning activities with children's real-life experiences. Children are encouraged not only to complete tasks but also to determine ideas, organize work procedures, select materials, and evaluate the products they create. Anggraini (2022) explained that, *"In project-based learning, children formulate ideas, plan work procedures, and determine the materials required to complete projects, thereby developing fluency and flexibility of thinking."* This planning process encourages children to become independent learners who actively construct knowledge through meaningful experiences while simultaneously developing creativity through physical-motor activities.

Based on preliminary observations and interviews conducted at Cemara Liliba Kindergarten, it was found that the school has begun implementing project-based learning activities in accordance with the Independent Curriculum. Children are not only asked to complete simple worksheet activities but are also involved in producing real products, such as making toy telephones from used cans and other recycled materials. This practice is consistent with the principles proposed by Kilpatrick (as cited in Gunawan, 2022), emphasizing that meaningful learning occurs when children learn through direct experience. Sari and Wijayanti (2023) also stated that children who participate in creating products independently gain more meaningful learning experiences because they are involved throughout the entire process, from planning to completing the final product.

The observation also revealed that Cemara Liliba Kindergarten possesses a supportive learning environment, including a spacious playground and adequate educational play equipment that facilitate physical-motor activities. However, despite these favorable conditions, classroom learning remains

predominantly teacher-directed, with children frequently following predetermined movement demonstrations rather than being encouraged to design, modify, or create their own movement patterns. As a result, opportunities for children to express creativity through physical activities have not yet been fully optimized.

Although previous studies have demonstrated the positive impact of Project-Based Learning on children's creativity, there remains limited empirical evidence regarding its implementation through physical-motor activities in authentic kindergarten settings using an ex post facto research design. In addition, previous studies have generally emphasized cognitive outcomes or artistic creativity, while relatively little attention has been given to creativity emerging from project-based physical-motor learning. This condition represents an important research gap that needs further investigation.

The novelty of this study lies in examining the contribution of Project-Based Learning implemented through physical-motor activities to the creativity of children aged 5–6 years using an ex post facto design in an authentic classroom context. Unlike previous studies, this research focuses on how project-based movement activities encourage children to generate original ideas, collaborate with peers, solve practical problems, and produce creative products through direct physical experiences.

Therefore, this study aims to examine the effect of the Project-Based Learning method implemented through physical-motor activities on the creativity of children aged 5–6 years at Cemara Liliba Kindergarten, Kupang City. The findings are expected to enrich the existing literature on innovative learning approaches in early childhood education and provide practical recommendations for teachers in designing project-based physical-motor learning activities that effectively foster children's creativity.

METHODS

The study employed a **quantitative approach using an ex post facto research design**. According to Sugiyono (2021), quantitative research is based on the philosophy of postpositivism and is used to collect numerical data that are analyzed statistically to test predetermined hypotheses. An ex post facto design was selected because the researcher investigated naturally occurring conditions without manipulating the independent variable or providing experimental treatment. Kerlinger and Lee (2022) explained that ex post facto research aims to examine causal relationships by analyzing phenomena that have already occurred. Accordingly, this design was considered appropriate for examining the influence of the implementation of physical-motor activities using the Project-Based Learning method on the creativity of children aged 5–6 years at Cemara Liliba Kindergarten.

The study involved two research variables. The independent variable (X) was the implementation of Project-Based Learning (PjBL) through physical-motor activities, whereas the dependent variable (Y) was the creativity of children aged 5–6 years. According to Arikunto (2023), an independent variable is a factor that influences other variables, while a dependent variable is the

outcome affected by changes in the independent variable. In this study, the implementation of Project-Based Learning refers to learning activities that actively engage children in completing meaningful projects through planning, exploration, collaboration, and product creation, whereas creativity refers to children's ability to generate original ideas, demonstrate flexibility, elaborate ideas, and express imagination during learning activities.

The instrument used to measure the implementation of Project-Based Learning was a psychological rating scale developed based on the Project-Based Learning indicators proposed by Thomas (2022) and adapted to the objectives of this study. The instrument consisted of 12 statement items covering three dimensions: Mindful (children's attention and active engagement), Meaningful (participation in meaningful learning activities), and Joyful (children's enjoyment during learning). Instrument validity was assessed using the corrected item-total correlation technique, and all items met the required validity criteria. The reliability analysis using Cronbach's Alpha produced a coefficient of 0.791, indicating that the instrument possessed good internal consistency and was appropriate for data collection.

Children's creativity was measured using a creativity scale developed from indicators of early childhood creativity. Creativity was defined as children's ability to generate original ideas, think fluently and flexibly, elaborate ideas, and express imagination through various learning activities. The instrument covered four indicators: (1) generating new ideas, (2) flexibility in movement and action, (3) originality in creating products or solving problems, and (4) sensitivity to surrounding situations and learning experiences.

According to Sugiyono (2021), the population is a generalization area consisting of subjects possessing particular characteristics determined by the researcher. The population of this study consisted of all children aged 5–6 years enrolled at Cemara Liliba Kindergarten. The sampling technique employed was purposive sampling, in which participants were selected according to predetermined criteria. Sugiyono (2021) stated that purposive sampling is a sampling technique based on specific research considerations. The inclusion criteria in this study were children who (1) actively participated in classroom learning activities, (2) were able to communicate effectively during learning, and (3) obtained parental and school approval to participate in the study. Based on these criteria, 20 children were selected as research participants, and this sample was considered adequate to represent the study population according to the characteristics required for the research objectives.

Data were collected through classroom observations and structured questionnaires completed by teachers based on children's learning activities. Before data analysis, descriptive statistics were used to describe the characteristics of each variable. Subsequently, simple linear regression analysis was conducted using SPSS version 25.0 to determine the effect of Project-Based Learning implementation on children's creativity. Statistical significance was determined at the 0.05 level.

This study was conducted with the permission of the school principal, and participation was voluntary with the approval of teachers and parents. All data obtained were kept confidential and used solely for research purposes.

RESULTS AND DISCUSSION

RESULTS

The following presents the statistical results of the application of Thematic Pop Up Book Media on the language ability of children aged 4–5 years at PAUD Nekafhonis.

Table 1. Category Results of Thematic Pop Up Book Media

| Category | Interval | Frequency | Percentage |
|----------|----------|-----------|------------|
| High | 29–32 | 9 | 52.9% |
| Medium | 23–28 | 5 | 29.4% |
| Low | 18–22 | 3 | 17.6% |
| Total | | 17 | 100% |

Based on Table 1, the implementation of thematic Pop Up Book media at PAUD Nekafhonis is predominantly in the high category, reaching 52.9% of respondents, followed by the medium category at 29.4% and the low category at 17.6%. These results indicate that the use of Pop Up Book media has been relatively well implemented in classroom learning activities. The dominance of the high category shows that teachers have generally integrated this media into storytelling and language learning processes. However, the existence of medium and low categories indicates that the consistency of media implementation still varies across learning sessions. Therefore, improvement in the regular and structured use of learning media is still needed to maximize its impact on children’s language development.

Table 2. Category Results of Language Ability of Children Aged 4–5 Years

| Category | Interval | Frequency | Percentage |
|----------|----------|-----------|------------|
| High | 27–33 | 9 | 52.9% |
| Medium | 22–26 | 7 | 41.2% |
| Low | 18–21 | 1 | 5.9% |
| Total | | 17 | 100% |

Based on Table 2, the language ability of children aged 4–5 years at PAUD Nekafhonis is mostly in the high category, with 52.9% of children achieving this level. Meanwhile, 41.2% are in the medium category and 5.9% are in the low category. These findings indicate that most children have developed relatively good language skills, particularly in speaking ability, vocabulary mastery, and story comprehension. However, the presence of children in medium and low categories shows that not all learners have achieved optimal language development. These differences may be influenced by

variations in learning stimulation both at school and at home, as well as individual developmental differences among children.

Table 3. Regression Analysis (F Test)

| Relationship | F | Sig. | Decision |
|--------------------------------------|-------|-------|-------------|
| Pop Up Book Media → Language Ability | 4.795 | 0.045 | Significant |

The F-test results in Table 3 show a significance value of 0.045 ($p < 0.05$) with an F value of 4.795, indicating that there is a statistically significant effect of thematic Pop Up Book media on the language ability of children aged 4–5 years. This result confirms that the independent variable contributes meaningfully to the dependent variable. In other words, the use of Pop Up Book media in learning activities is able to influence children’s language development in a positive direction. This finding supports the idea that interactive and visually engaging learning media can enhance children’s involvement in learning and improve their ability to understand and express language.

Table 4. Coefficient of Determination (R Square)

| Model | R | R Square | Adjusted R Square | Std. Error |
|-------|-------|----------|-------------------|------------|
| 1 | 0.492 | 0.242 | 0.192 | 4.387 |

Based on Table 4, the coefficient of determination (R Square) value is 0.242, meaning that 24.2% of the variation in children’s language ability can be explained by the use of thematic Pop Up Book media. Meanwhile, the remaining 75.8% is influenced by other factors outside the model. These factors may include family environment, home literacy activities, peer interaction, and individual developmental differences. This result indicates that although Pop Up Book media has a significant contribution to language development, it is not the only factor influencing children’s language ability. Therefore, support from both school and home environments remains essential in optimizing children’s communication and language development.

Table 5. Partial Test (t-Test)

| Relationship | t | Sig. | Decision |
|--------------------------------------|-------|-------|-------------|
| Pop Up Book Media → Language Ability | 2.190 | 0.045 | Significant |

The t-test results in Table 5 show a significance value of 0.045 ($p < 0.05$) with a t value of 2.190, indicating a significant positive relationship between thematic Pop Up Book media and children’s language ability. This means that the better the implementation of Pop Up Book media in learning activities, the higher the improvement in children’s language skills. The findings suggest that this media plays an important role in stimulating children’s speaking, listening, and storytelling

abilities. Its visual and interactive characteristics make learning more engaging and meaningful, thereby encouraging active participation in language-based activities.

Table 6. Descriptive Analysis of Thematic Pop Up Book Media

| Aspect | Mean | Category |
|------------------|------|----------|
| Visual Display | 2.88 | High |
| Thematic Content | 2.92 | High |
| Interactivity | 2.91 | High |

Based on Table 6, the descriptive analysis shows that all aspects of thematic Pop Up Book media are in the high category. Thematic Content obtained the highest mean score (2.92), followed by Interactivity (2.91) and Visual Display (2.88). These results indicate that the media is well designed in terms of content relevance, visual appeal, and interactive features. The high score on thematic content shows that contextual and real-life-based stories are highly effective in helping children understand learning materials. Meanwhile, visual display and interactivity also play important roles in attracting children’s attention and encouraging active participation in learning activities.

The results of the statistical description of the data on the implementation of Project Based Learning and the development of early childhood creativity can be described as follows:

Table 1. Category of Project-Based Learning Implementation

| Category | Interval | Frequency | Percentage |
|----------|----------|-----------|------------|
| High | 46–56 | 8 | 33.33% |
| Medium | 33–45 | 5 | 41.67% |
| Low | 20–32 | 7 | 25.00% |
| Total | | 20 | 100% |

Based on the results of the table above, it can be seen that the implementation of Project Based Learning which is included in the high category is in the score interval of 46–56 with a frequency of 8 children or 33.33%, the medium category is in the score interval of 33–45 with a frequency of 5 children or 41.67%, and the low category is in the score interval of 20–32 with a frequency of 7 children or 25.00%. Thus, it can be seen that the implementation of project-based learning is included in the medium category with the highest percentage, which is 41.67%.

These findings indicate that the implementation of Project-Based Learning at Cemara Liliba Kindergarten has generally been carried out adequately, although the level of children's participation varies across learning activities. The predominance of the medium category suggests that most learning activities have incorporated the essential characteristics of Project-Based Learning, including children's active participation in planning, implementing, and completing project activities.

Nevertheless, several children remain in the low category, indicating that the implementation has not yet been fully optimized for all learners. This finding implies that greater consistency in facilitating project activities is still needed to ensure that every child experiences meaningful, active, and collaborative learning opportunities.

In project-based learning theory, according to Thomas (2022), it is stated that this approach is a child-centered learning activity, lasts for a certain period of time, and involves the process of planning, implementing, and producing meaningful real works for children. Furthermore, Munandar (2021) explained that project-based learning provides space for children to explore ideas, develop imagination, and try various ways to solve problems independently or with friends. At an early age, this activity is an effective means to foster creative thinking skills because children are directly involved in real learning experiences, so that the knowledge and skills gained are more inherent and useful for their further development.

The findings of this study are consistent with constructivist learning theory, which emphasizes that children learn more effectively through direct experience than through passive instruction. The implementation of Project-Based Learning enables children to actively construct knowledge while interacting with peers and teachers, thereby creating opportunities to develop creativity through authentic learning experiences. This finding also supports previous studies reporting that project-based activities encourage greater engagement, independence, and problem-solving skills among young children.

Table 2. Development of Creativity through Physical Motor Activities

| Category | Interval | Frequency | Percentage |
|----------|----------|-----------|------------|
| High | 61–78 | 9 | 41.67% |
| Medium | 43–60 | 9 | 41.67% |
| Low | 25–42 | 2 | 16.66% |
| Total | | 20 | 100% |

Based on the results of the table above, as many as 9 children were in the high category of 41.67%, meaning that they showed excellent creativity and motor physical development. Children in this group are able to generate original ideas while working on projects, as well as have sufficient hand-eye coordination and muscle strength to turn their ideas into real work.

A total of 9 children (41.67%) were in the medium category, indicating that they were able to demonstrate creativity during project activities but still required teacher guidance to develop more original ideas and improve the quality of their products.

The remaining 2 children (16.66%) are still in the low category. This suggests that despite being exposed to PjBL, they still experience significant barriers in connecting creative ideas with physical

execution. For example, a child may have a good idea but have difficulty making it happen due to fine motor limitations, or vice versa the child is physically active but less innovative in completing projects.

Overall, these results indicate that most children have demonstrated satisfactory creativity development through physical motor activities. The relatively high proportion of children in the high and medium categories suggests that project-based activities provide sufficient opportunities for children to explore ideas, express imagination, and transform creative thinking into tangible products. However, the existence of children in the low category indicates that creativity develops at different rates and is influenced by individual readiness, previous learning experiences, and the level of guidance provided during project implementation. Therefore, continuous support from teachers remains essential to facilitate optimal creativity development for all children.

According to Suyanto and Samsudin (2021), early childhood creativity is a divergent thinking process that involves flexibility and originality. This is in line with the findings of UNICEF Indonesia (2022), which state that creativity is a child's basic right that needs to be stimulated through play and exploration. In the context of Cemara Liliba Kindergarten, the implementation of Project-Based Learning provides space for children to realize this creativity through meaningful physical activities, as explained by Lestari and Fitriani (2024), who found that fine motor skills develop optimally when children are involved in real projects.

These findings also strengthen previous empirical evidence demonstrating that project-based activities encourage children to become more confident in expressing ideas, experimenting with different approaches, and collaborating with peers. Consequently, Project-Based Learning not only enhances physical motor competence but also creates a supportive learning environment that nurtures creativity, independence, and active participation throughout the learning process.

Table 3. Summary of Simple Linear Regression Analysis Results (Simultaneous F Test)

| Correlation | F | Note | Conclusion |
|---|-------|----------------|---------------------|
| Project-Based Learning → Early Childhood Creativity | 7.877 | 0.012 p < 0.05 | Hypothesis Accepted |

Table 4. Summary of Coefficient of Determination (R Square)

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------|----------|-------------------|----------------------------|
| 1 | 0.552 | 0.304 | 0.266 | 7.25204 |

Based on table 3 and table 4, a summary of the results of the simultaneous hypothesis test (F) shows that there is a significant positive influence between the application of Project-Based Learning on the development of early childhood creativity with a value of $p = 0.012$ and $F = 7.877$ with R Square = 0.304. The effective contribution of the Project-Based Learning variable to the development

of early childhood creativity was 30.4% and the remaining 69.6% was explained by other variables that were not studied in this study.

These findings demonstrate that Project-Based Learning contributes meaningfully to the development of children's creativity. Although the contribution is categorized as moderate (30.4%), the statistical significance indicates that the implementation of project-based activities plays an important role in stimulating children's creative potential. The remaining variance suggests that creativity is a multidimensional construct influenced by numerous factors beyond classroom learning, including children's individual characteristics, parental support, home learning experiences, teacher competence, peer interaction, and the overall educational environment. Therefore, Project-Based Learning should be viewed as one of several complementary strategies for promoting creativity rather than the sole determining factor.

The positive relationship identified in this study supports the constructivist perspective, which argues that knowledge is developed through active engagement with meaningful experiences. Through project implementation, children are encouraged to observe, explore, make decisions, collaborate with peers, and produce concrete products. Such learning experiences provide opportunities for children to develop divergent thinking, originality, flexibility, and confidence, which are recognized as essential indicators of creativity in early childhood education.

Table 5. Descriptive Analysis Results of Project-Based Learning

| Aspect | Range | Minimum | Maximum | Mean | Std. Error | Std. Deviation |
|--------------------|-----------|---------|---------|-------|------------|----------------|
| Mindful | 20 8 | 9 | 17 | 13.25 | 0.491 | 2.197 |
| Meaningful | 20 11 | 9 | 20 | 15.20 | 0.735 | 3.286 |
| Joyful | 20 9 | 11 | 20 | 15.75 | 0.593 | 2.653 |
| Valid N (listwise) | 20 | | | | | |

Table 5 of the results of the descriptive analysis found that the average value of the mindful aspect was 13.25, the meaningful specification was 15.20, and the joyful aspect was 15.75.

The descriptive findings indicate that all three dimensions of Project-Based Learning were implemented at relatively high levels. Among these dimensions, the joyful aspect obtained the highest mean score, suggesting that children experienced learning activities in an enjoyable, engaging, and emotionally supportive environment. Meanwhile, the meaningful aspect also demonstrated a relatively high average, indicating that learning activities were closely connected to children's real-life experiences. Although the mindful aspect obtained the lowest mean among the three dimensions, the score still reflects that children were actively involved, attentive, and able to participate throughout the project implementation process. Collectively, these findings indicate that Project-Based Learning was

implemented in accordance with its fundamental principles of promoting meaningful, enjoyable, and active learning experiences.

This study proves the accepted hypothesis that Project-Based Learning has a positive and significant effect on the development of creativity in children aged 5–6 years. This is evidenced by the statistical test of F calculation of 7.877 at a significance level of 0.012 ($p < 0.05$). So, Project-Based Learning has a significant influence on the development of children's creativity with an R Square value of 0.304 or 30.4%. Thus, it can be interpreted that the development of children's creativity is influenced by Project-Based Learning by 30.4% and the remaining 69.6% is influenced by other factors that are not studied in this study. In this study, it is said that the better and more directed the implementation of Project-Based Learning, the more the development of creativity of children aged 5–6 years will increase.

These findings indicate that consistent implementation of Project-Based Learning creates an environment that encourages children to explore ideas independently while remaining supported by teachers and peers. Rather than merely completing assigned tasks, children become active participants in planning activities, selecting materials, solving simple problems, and presenting their work. Such learning experiences provide valuable opportunities for children to strengthen higher-order thinking skills and creativity simultaneously. Therefore, the effectiveness of Project-Based Learning lies not only in the final product but also in the learning process that enables children to construct knowledge through authentic experiences.

The mindful aspect obtained an average score of 13.25. This shows that in the implementation of learning, children are able to concentrate and actively participate in each stage of the project activities given. Although the score is the lowest compared to the other two aspects, this figure already shows that the child is quite good in observing, listening, and doing tasks gradually. This result is in accordance with the value of the contribution obtained, where full involvement is the main requirement for children to develop their ideas and creative thinking. The higher the attention that children give, the greater their opportunities to explore various possibilities in completing the activities given.

These findings indicate that children's active engagement during project implementation serves as the foundation for creativity development. When children are encouraged to observe, ask questions, and participate in each stage of project completion, they gradually construct their own understanding through direct experience. This learning process is consistent with constructivist principles, which emphasize that meaningful knowledge is developed through active participation rather than passive instruction. Consequently, the mindful dimension contributes not only to children's concentration but also to their ability to generate ideas, make decisions, and solve problems creatively during project activities.

The meaningful aspect obtained an average score of 15.20. This figure indicates that the Project-Based Learning activities that are prepared have a clear meaning and are relevant to the child's experiences and daily lives. Meaningful learning makes children not only follow directions, but also understand the purpose and benefits of what they are doing. This condition is very supportive of the development of creativity, because when children understand the context of the activity, they will be more motivated to come up with new ideas and look for varied ways to solve them. This is reflected in the contribution of influence of 30.4%, where the significance of the activity is one of the main determinants of the effectiveness of this method.

Meaningful learning experiences enable children to connect classroom activities with real-life situations, thereby increasing intrinsic motivation and encouraging deeper cognitive engagement. Children who understand the purpose of an activity tend to participate more enthusiastically, demonstrate greater persistence when encountering challenges, and express their ideas more confidently. Therefore, the meaningful dimension plays an important role in strengthening creativity because it transforms learning activities from routine classroom tasks into authentic experiences that stimulate exploration, imagination, and independent thinking.

The joyful aspect obtained the highest average score of 15.75. This shows that Project-Based Learning takes place in a fun, enthusiastic, and stress-free atmosphere for children. This positive atmosphere is a very important driving factor, because children will be more courageous to explore, try new things, and express their opinions without fear of being wrong. This high average value is in line with the results of significant influence tests, where a pleasant atmosphere becomes a bridge so that the process of developing creativity can run naturally and optimally.

The highest score obtained by the joyful dimension demonstrates that positive emotional experiences are essential for maximizing children's creativity. Enjoyable learning environments reduce anxiety and encourage children to experiment freely without fear of failure. Such conditions provide opportunities for children to express imagination, collaborate with peers, and develop original ideas through exploration. Consequently, joyful learning not only enhances children's motivation but also creates a psychologically safe environment that supports the continuous development of creative thinking.

The results of this study are in line with the findings of Wulandari (2023), who stated that there is a positive and significant effect of the application of Project-Based Learning on the development of early childhood creativity with a determination value (R Square) of 28.7%, which means that the influence of Project-Based Learning on children's creativity development is 28.7%. Research by Suparno (2022) and Rahmawati and Kurniawati (2022) found a correlation of 0.598, which means that there is a fairly strong relationship between the application of learning methods and the level of early childhood creativity development. According to Santrock (2022), learning

that is fun, meaningful, and involves children's full attention will build open thinking habits, so that the ability to create new ideas can grow and develop sustainably.

The consistency between the present findings and previous studies strengthens the empirical evidence supporting Project-Based Learning as an effective instructional approach for early childhood education. Although the magnitude of the contribution varies across studies due to differences in research settings, participant characteristics, and implementation procedures, the overall findings consistently indicate that project-based activities facilitate children's creative development by promoting exploration, collaboration, and authentic problem-solving experiences. These similarities suggest that Project-Based Learning can be effectively implemented across different educational contexts while maintaining its positive influence on children's creativity.

This research was conducted by Konscansa et al. (2024) involving children aged 5–6 years at Bina Karya Kindergarten, Samarinda City, showing similar results, where the application of a structured learning approach but still providing freedom of exploration has been proven to be able to significantly improve the quality of children's creative thinking. This further strengthens the evidence that Project-Based Learning is one of the alternative approaches that is effective and feasible to continue to be developed in the implementation of early childhood education.

Furthermore, the findings highlight that the effectiveness of Project-Based Learning depends not only on the instructional model itself but also on how teachers facilitate children's exploration throughout the learning process. Teachers who provide appropriate guidance while maintaining children's autonomy create opportunities for meaningful learning experiences that enhance creativity. Therefore, effective implementation requires careful planning, appropriate learning resources, and continuous teacher support to maximize children's creative potential.

Overall, the findings demonstrate that Project-Based Learning provides a learning environment that simultaneously promotes children's cognitive engagement, meaningful participation, and positive emotional experiences, all of which contribute to creativity development. The integration of the mindful, meaningful, and joyful dimensions enables children to actively construct knowledge through authentic projects while strengthening their confidence to express original ideas. These findings suggest that Project-Based Learning should be implemented consistently as part of early childhood instructional practice, not only to improve creativity but also to foster problem-solving skills, collaboration, independence, and lifelong learning dispositions.

CONCLUSION

Main Findings: This study found that Project-Based Learning has a positive and significant effect on the creativity development of children aged 5–6 years at Cemara Liliba Kindergarten, with an R Square value of 0.304, indicating a contribution of 30.4% to children's creativity development. **Research**

Contribution: This study provides empirical evidence through an ex post facto design, demonstrating the effectiveness of Project-Based Learning in enhancing early childhood creativity in an authentic classroom setting. **Theoretical and Practical Implications:** The findings support constructivist learning theory and suggest that teachers should consistently implement Project-Based Learning through mindful, meaningful, and joyful activities that encourage exploration, collaboration, and creative expression. **Research Limitations:** This study involved only 20 children from one kindergarten and examined a single independent variable, limiting the generalizability of the findings. **Future Research Directions:** Future studies should include larger and more diverse samples and examine additional variables, such as parental involvement, classroom environment, and learning motivation, to better explain children's creativity development.

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