Journal of English Language and Education
ISSN 2597- 6850 (Online), 2502-4132 (Print)
Journal Homepage: https://jele.or.id/index.php/jele/index

Article

Creative Science Learning Model for Early Childhood in Palangka Raya

https://doi.org/10.31004/jele.v10i5.1165

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A B S T R A C T

This study aims to develop a science learning model that can improve the creativity of early childhood (Early Childhood). The study was conducted in two Early Childhood Education institutions, namely TK Negeri Pembina Pahandut and TK Rajawali Sakti in Palangka Raya City. A qualitative approach with a multi-case study design was used to explore the implementation process, assessment models, and supporting and inhibiting factors for the development of creativity through science. The results of the study indicate that the implementation of project-based learning, exploration, experiments, and games has a positive impact on children's cognitive, affective, and psychomotor aspects. The implications of this study encourage the need to strengthen teacher training and provide creative science learning facilities in Early Childhood Education.

Keywords: *Early Childhood, Creativity, Science, Learning Models, PAUD*

Article History:
Received 27th June 2025
Accepted 30th August 2025
Published 09th September 2025

INTRODUCTION

Creativity is one of the important elements in early childhood development which has a strategic role in shaping children's character, critical thinking skills, and social skills. In the context of early childhood education (PAUD), creativity is not only a means of expression, but also a way to explore the world around us through a fun and meaningful approach. Runco and Jaeger (2012) define creativity as the ability to generate useful new ideas.

In education, especially at an early age, creativity can be fostered through exploration-based learning and hands-on experience. One effective approach to stimulate children's creativity is through science learning. Science learning in PAUD not only introduces children to simple scientific concepts, but also provides opportunities to explore, experiment, and ask questions. The National Research Council (2012) emphasizes that science education plays an important role in stimulating critical and creative thinking skills in children.

In the era of globalization and the Industrial Revolution 4.0, 21st century skills such as the 4Cs (Critical Thinking, Creativity, Collaboration, and Communication) are demands that must be developed from an early age (Trilling & Fadel, 2009). Therefore, the merger between science learning and creativity development becomes relevant and strategic.

In practice, science learning in PAUD can be carried out through experimental activities, observation, and exploration of the surrounding environment. For example, mixing colors, observing plant growth, or getting to know the properties of objects can be a means to build science literacy while stimulating children's creativity. Harlen (2000) states that science literacy is a fundamental skill that is important for the 21st century, which includes the ability to understand, be aware of, and respond critically to environmental phenomena. It is within this framework that children's creativity can develop optimally through the right learning approach.

Early childhood is in the golden age, which is a period of brain development that is very rapid and sensitive to various stimuli. During this time, the right stimulation can have a long-term impact on the child's potential. Novitawati (2016) said that early childhood is the best period in shaping children's character and basic abilities. Therefore, PAUD has an important role in providing an environment conducive to the development of children's potential, including creativity.

The educational context in Indonesia shows that there are still challenges in the implementation of science learning that encourages creativity. A report from the Ministry of Education and Culture (2020) shows that students' interest and ability in science is still low. This shows the need for innovation in the learning approach, especially at the PAUD level. Government Regulation No. 17 of 2010 and Permendikbud No. 137 of 2014 underline the importance of developing six aspects of child development, including cognition and creativity. The 2013 Curriculum and the Independent Curriculum provide a wider space for teachers to design learning based on exploration, imagination, and creativity (Mulyasa, 2017).

In this context, collaboration between teachers, parents, and the community is key. Research by Soni and Soni (2020) shows that active involvement from various parties can create a learning environment that supports the development of children's creativity. The model of parental involvement developed by Epstein (2010) includes six dimensions, namely parenting, communication, volunteering, home learning, decision-making, and community cooperation. When all parties are involved, the process of developing creativity becomes more optimal.

This study was carried out in two PAUD institutions in Palangka Raya City, namely Kindergarten Negeri Pembina Pahandut and Kindergarten Kristen Rajawali Sakti-3. These two schools have shown commitment to developing students' creativity through various activities, both academic and non-academic. Kindergarten Negeri Pembina Pahandut is known for its achievements in the fields of art and science, supported by close collaboration between teachers, parents, and the community. Meanwhile, Rajawali Sakti-3 Christian Kindergarten has implemented project-based, collaborative, and interdisciplinary learning as a strategy to increase children's creativity.

The results of preliminary observations showed that children in both schools had a high interest in simple exploration and experimentation. However, science learning still tends to be teacher-centered and has not fully provided space for children to experiment independently. This shows the need for a more creative, participatory, and innovative science learning model to encourage optimal creativity development.

The purpose of this research is to develop a science learning model that is able to increase early childhood creativity through an exploratory and experiential approach. This study also aims to evaluate the learning process, assessment models (cognitive, affective, psychomotor), as well as supporting and inhibiting factors in the application of creative science learning in PAUD. By examining the implementation of learning at Kindergarten Negeri Pembina Pahandut and Kindergarten Kristen Rajawali Sakti-3, it is hoped that effective learning patterns can be found and can be replicated in other PAUDs.

Developing early childhood creativity through science requires the right learning strategies. These strategies include active learning methods, the use of simple props, and contextual approaches that are relevant to the child's daily life. Teachers must be able to design learning activities that stimulate imagination, encourage children to ask questions, and facilitate exploration freely and safely. In addition, learning assessments must be able to comprehensively capture the process and results of children's creativity.

Thus, this research not only provides theoretical contributions in the field of early childhood education and science, but also provides practical guidance for teachers and early childhood education institutions in designing and implementing learning oriented to the development of children's creativity through a science approach (Sternberg, 2018; Clark, 2005).

METHOD
This study uses a descriptive qualitative approach with a multi-site study design. The main strategy in this study is phenomenology, with the aim of exploring in depth the experience, meaning, and dynamics of the development of science creativity in early childhood in two PAUD institutions, namely Kindergarten Negeri Pembina Pahandut and Kindergarten Kristen Rajawali Sakti in Palangka Raya City. The qualitative approach allows researchers to explore and understand social realities based on participants' perspectives through in-depth interviews, observations, and documentation.

This type of research is qualitative field research. The phenomenological strategy was chosen to explore the subjective experience of teachers and principals in applying the creative science learning model in each institution. The research was conducted flexibly and openly to field dynamics, allowing design changes as data collection took place according to actual findings (Smith, 2014).

The research design is multi-site with the aim of comparing and finding general patterns and specificities between two PAUD institutions. Each site is researched to the point of data saturation, then cross-site analysis is carried out to draw more comprehensive conclusions. According to Bogdan and Biklen (1982), multi-site studies contribute to theoretical generalizations and reinforce the external validity of findings.

Presence of Researchers

The researcher was present directly at the Pembina Pahandut State Kindergarten and the Rajawali Sakti Christian Kindergarten-3 as the main instruments in data collection, according to a qualitative approach that places humans as the main tools (Wiriatmaja, 2007). This attendance is carried out regularly to conduct observations and interviews, as well as interact directly with teachers and students to obtain accurate data. The researcher also conducts preliminary studies to ensure the subject's readiness, predict obstacles, and formulate anticipatory measures. This direct presence not only strengthens the validity of the data, but also deepens the researcher's understanding of the situation being studied.

Research Location

The research was conducted at Kindergarten Negeri Pembina Pahandut and Rajawali Sakti Christian Kindergarten. These two institutions were chosen because they have demonstrated real practice in the development of creativity and science learning. Kindergarten Negeri Pembina Pahandut has a track record of achievements in the fields of art and science, as well as active involvement of parents. Meanwhile, Rajawali Sakti Christian Kindergarten is known for its project-based collaborative approach and contextual approach in learning.

Data Source

The data sources in this study consist of primary and secondary data. Primary data was obtained through observation, in-depth interviews, and documentation of school principals, teachers, and parents. Secondary data comes from institutional documents such as school profiles, syllabus, RPPH, evaluations, and learning activity archives. The focus of data collection includes the learning process, cognitive-affective-psychomotor assessment, and supporting or inhibiting factors.

Data Collection Techniques

In-depth Interview: Conducted freely and openly (unstructured), aiming to explore perceptions, experiences, and strategies applied by teachers and principals in developing children's creativity through science.

Participatory Observation: Researchers engage directly in learning activities to record children's behaviors, responses, and interactions in science activities.

Documentation: Supporting data in the form of activity photos, teacher reflection notes, curriculum documents, and achievement archives are used to reinforce the findings from interviews and observations.

Research Instruments

The main instrument is the researcher himself. To support data collection, interview guides, observation sheets, and document checklists are used. The preparation of instruments is carried out based on indicators of creativity and science learning such as the ability to explore, experiment, imagine, collaboration, and reflection.

Data Analysis Techniques

Data analysis was carried out using an interactive approach of the Miles and Huberman (2014) model which includes three stages: (1) data reduction, (2) data presentation, and (3) conclusion drawn/verification. Data from each site were first analyzed separately (single site), then cross-site analysis was carried out as shown in Figure 1. to find similarities and differences, as well as formulate substantive theories.

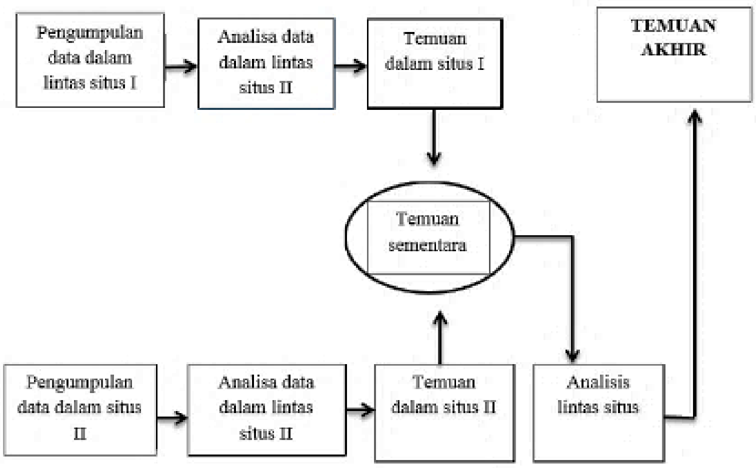

Figure 1. Cross-Site Data Analysis

Data Validity

To ensure the validity and reliability of the data, triangulation of sources and methods, extension of the presence of researchers, peer checking, and discussion of results with key informants were carried out. Triangulation was carried out by comparing the results of interviews, observations, and documents. Dependability is tested through an audit of the research process, while confirmability is obtained through validation of findings with informants.

Research Stages

The research was carried out in four stages (can be seen in Figure 2): (1) the pre-field stage (problem formulation, preliminary study, and proposal preparation), (2) field preparation stage (coordination with institutions, scheduling, and tools), (3) data collection and analysis stage (observation, interview, documentation, and single- and cross-site analysis), and (4) reporting and validation stage (writing results, consultation, and revision).

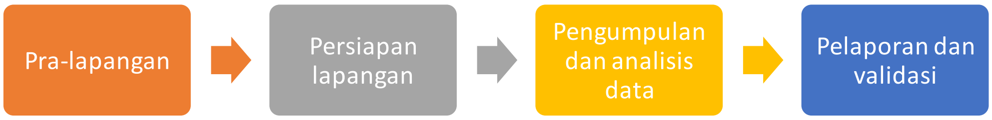

Figure 2. Research Stages

With this methodology, the research is expected to be able to capture the real dynamics of science learning that develops children's creativity authentically, in-depth, and contextually in accordance with the characteristics of each PAUD institution.

FINDINGS AND DISCUSSION

The results of the study from the two locations show that the development of science through creativity is carried out through an active, fun, and exploratory approach. At Kindergarten Negeri Pembina Pahandut, teachers carry out learning with an innovative thematic approach, utilizing the surrounding environment, and facilitating exploration and experiment activities such as making mini water filters, inflatable foam snakes, and langang milk. Teachers demonstrate strong pedagogic competence in understanding children's characters, designing varied learning, and conducting continuous evaluation through anecdotal notes and routine coordination. The main obstacles come from the lack of facilities, mastery of technology, and the psychological condition of children influenced by the family environment. Schools respond through parent involvement, teacher coaching, and an individualized approach to children.

Meanwhile, Rajawali Sakti Christian Kindergarten-3 develops science creativity through the integration of experiments, art, and games. Children are encouraged to experiment, work together in group projects, and express themselves creatively. Teachers arrange learning based on PROTA, PROSEM, RPPM, and RPPH which are adjusted to the Independent Curriculum. Evaluations are carried out systematically, both daily and monthly. The obstacles found include changes in children's mood, limited family support, and children's social dynamics such as peer influence. The solutions implemented include regular communication with parents, the use of liaison books, and teacher training activities.

Cross-site analysis shows that both schools equally place exploration and experimentation at the core of creative science learning. The equation lies in the effort to create participatory and fun learning. The difference can be seen from the classroom management strategy and the form of parental involvement. At Kindergarten Negeri Pembina Pahandut, the approach emphasizes more on strengthening children's character and responsibility, while at Rajawali Sakti-3 Christian Kindergarten, it is more about exploratory and collaborative habituation from the time the child comes home. In general, creativity-based science learning in both schools showed positive results in increasing children's curiosity, courage to try, and problem-solving skills. This supports the idea that science learning that integrates creativity can be an effective approach to building a foundation for critical thinking from an early age.

This study also revealed several important findings related to the implementation of science creativity education in PAUD, especially at Pembina Pahandut State Kindergarten and Rajawali Sakti Christian Kindergarten-3 Palangka Raya City. The findings are classified into four main aspects: the implementation of science creativity education, teacher competence, implementation barriers, and program evaluation.

Implementation of Science Creativity Education

Both schools show a progressive approach to providing science education that is contextual, fun, and hands-on experience-based. The implementation of education is based on the Independent Curriculum which is flexible and oriented towards children's developmental achievements.

The science program includes a variety of activities such as simple experiments (e.g., telang flower experiments), observation of the natural environment, and collaborative projects. The "learn while playing" approach is the main method used. Teachers act as facilitators and use teaching aids and visual media to help children understand science concepts.

These findings are in line with Piaget's theory, which states that early childhood is in the preoperational stage and learns through direct interaction with its environment. Science education that allows children to explore and build their own knowledge can foster creativity and critical thinking skills.

In addition, parental involvement in activities such as market days and science workshops is a good practice that supports learning success. This reflects the importance of collaboration as affirmed in Vygotsky's theory, that social interaction with adults and peers accelerates children's cognitive development and creativity.

Competencies of Early Childhood Education Teachers

Teachers in both institutions have adequate competence in designing, implementing, and evaluating creative science learning. The division of tasks is carried out by the principal by paying attention to the level of experience of teachers, especially in handling the age group of 5–6 years.

Teachers not only carry out pedagogical duties as learning facilitators, but are also responsible for administration such as the preparation of learning implementation plans and evaluations. This competence is the key to the implementation of quality science education, according to the opinion of Usman (2000).

In line with Erna Dwirahman's view, teachers must be able to provide space for children to think freely and innovate through creative project activities. This shows the importance of the professionalism of PAUD teachers in supporting creativity-based learning.

Implementation Barriers

Although the implementation of the program showed success, several obstacles were found, both from internal and external factors. The main obstacles come from: (a) Parents: The low participation of some parents in supporting school programs is a challenge in itself. In fact, the active involvement of parents is very necessary in building children's exploratory and creative habits at home. (b) Children: Differences in character, adaptability, and motivation in early childhood are challenges in the learning process. Not all children can immediately adjust to a dynamic and exploratory learning environment.

Other factors include limited learning media, lack of teacher training, and negative perceptions of science. References from Montessori (1964), Hawkins (1974), and NAEYC (2009) emphasize the importance of science learning that is exploratory, hands-on, and child-centered.

These constraints underscore the need for support for a positive and integrative learning environment between schools, homes, and communities. External factors such as the availability of resources and policies also affect the smooth implementation.

Implementation Evaluation

The evaluation of science creativity education is carried out by three elements: the principal, teachers, and the committee/parents of the students. The principal evaluates the suitability of the school's vision and mission to the development of science creativity. Teachers are evaluated based on learning methods, child involvement, and the effectiveness of the training received. Meanwhile, the committee and parents contribute through financial support and participation in school activities.

Success indicators can be seen from: (1) Increased curiosity and involvement of children in experiments. (2) Children show the ability to work together, think critically, and express creative ideas. (3) The integration of art in science learning adds attractiveness and strengthens the understanding of concepts.

In line with the Montessori approach, the use of concrete materials and hands-on experience makes learning more meaningful and effective. The evaluation shows that the different approaches between Pembina Kindergarten and Rajawali Kindergarten have their own advantages and can complement each other when collaborated.

Thus, the implementation of science creativity education in these two schools has shown positive results in developing early childhood potential. The implementation of project-based, participatory, and collaborative learning has had a real impact on children's 21st century skills. However, optimizing the role of parents, improving teacher training, and providing supporting infrastructure remain important factors for future improvement.

CONCLUSIONS

The implementation of science creativity education at Kindergarten Negeri Pembina Pahandut and Kindergarten Kristen Rajawali Sakti-3 has shown a strong commitment to creating a learning environment that supports the development of children's science skills. The program is designed based on direct experience, uses a thematic approach that is integrated with parental involvement and is evaluated periodically. Principals and teachers have an important role in fostering students' creativity through interactive and fun methods. Teachers in both kindergartens demonstrate adequate competence in designing, implementing, and evaluating innovative science learning. They actively participate in training and develop creative teaching strategies to increase child engagement. However, the implementation of the program still faces a number of obstacles. These challenges include lack of parental participation, limited experimental tools and materials, lack of teacher training, monotonous learning methods, and limited time in the curriculum. The diverse characteristics of children also affect the effectiveness of learning. Evaluation of program implementation carried out by school principals, teachers, and committees/parents found similar obstacles. This evaluation is an important means of assessing the strengths and weaknesses of the program and developing a more effective improvement strategy in the future. Based on the findings, several suggestions can be proposed. First, teachers are expected to continue to improve their competencies through continuous training, especially in the use of interesting and fun science learning methods and media. Second, school principals need to provide broader support in teacher professional development and create a school atmosphere that supports collaboration. Third, for future researchers, it is hoped that they can develop a more creative, diverse, and adaptable approach to science education in order to achieve optimal educational outcomes.

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