Implementation of the STEAM Learning Method on Critical Thinking Skills in Early Childhood

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KEYWORDS	ABSTRACT
implementation, learning, thinking, early childhood	The objective of this study is to analyze and describe the application of the STEAM learning method in fostering critical thinking skills in early childhood education. This type of research is qualitative research with the aim of analyzing the implementation of the STEAM learning method on thinking abilities in early childhood. This research is needed so that educators can implement the STEAM learning method for the thinking abilities of young children. The subjects in this research were 10 students of Kindergarten B RA Bina Insani Al-Ma'ruf in Nglaban hamlet, Maron village, Banyakan district. This research uses observation data collection, in-depth interviews, and documentation. This research resulted that the implementation of STEAM learning at RA Bina Insani Al-Ma'ruf was carried out in every children's play activity. This learning involves several aspects of child development that are integrated and fun for children. In STEAM learning activities, the teacher acts as a facilitator and motivator according to the plans that have been prepared. This learning involves several aspects of child development that are integrated and fun for children. In STEAM learning activities, the teacher acts as a facilitator and motivator according to the plans that have been prepared. Basically, the implementation of STEAM learning at RA Bina Insani Al-Ma'ruf has principles based on attitudes, skills and knowledge.

INTRODUCTION

Early Childhood Education is a level of education before basic education which is a coaching effort aimed at children from birth to the age of six. Through early childhood education, children can foster, grow and develop all their potentials optimally so that basic behaviors and abilities are formed according to their developmental stages. Based on Law Number 20 of 2003 concerning the National Education System Chapter I, Article I, Point 14, which states that: "Early Childhood Education is a coaching effort aimed at children from birth to the age of 6 years which is carried out through the provision of educational stimuli to help physical and spiritual growth and development so that children have readiness to enter further education (Daulae, 2019; Hsiao & Su, 2021).

Good early childhood education is education that can optimize all aspects of children's development and growth and is able to provide children to face the 21st century. One of the 21st century skill development can be achieved through education. There are four competencies in the 21st century known as the "4Cs", namely (1) Critical Thinking, (2) Communication, (3) Collaboration, and (4) Creativity and Innovation. Critical thinking skills are part of a child's

cognitive ability, cognitive ability is one of the abilities that must be possessed by every child and must develop according to their age level (Karataş & Arpacı, 2021; Maksum et al., 2021).

Critical thinking skills in early childhood can be improved through effective learning approaches such as the STEAM learning method. The STEAM learning method is a learning that integrates science, technology, engineering, art, and mathematics which aims to enable children to think critically and be able to solve problems creatively. According to Chintya (2021), the application of the STEAM learning method needs to be carried out early in PAUD because PAUD is a form of education that focuses on laying the foundation (MZ & Syafi'i, 2021; Nurpratiwiningsih & Setiyoko, 2018).

Critical thinking skills include cognitive abilities which include problem-solving skills, symbolic and logical thinking. The application of the STEAM method can improve critical thinking skills in early childhood in solving a problem. This research focuses on the implementation of the STEAM learning method on critical thinking skills in early childhood. The purpose of this study itself is to describe the application of critical thinking skills in children aged 5-6 years at RA Bina Insani Al-Ma'ruf.

Early childhood has the potential to develop the basics of critical thinking skills. This potential can be realized if children get learning stimulation in the PAUD unit. The STEAM learning method integrates various things, makes connections or interconnections, builds and strengthens networks in the brain, so that it can build higher order thinking skills (HOTS), because in reality, in life, various disciplines, events, are interrelated (Degeng, 2021; Twiningsih & Elisanti, 2021).

The application of STEAM learning in early childhood is part of learning innovations in order to face the current revolutionary era. The STEAM method combines five fields of science in one activity, namely science, technology, engineering, arts, and mathematics. The STEAM learning method is an integrated learning approach that aims to expand children's mindset about problems that exist in the real world. According to Yakman (2018), the concept of STEAM linkage is carried out through integrative thematic learning that uses a game-based curriculum.

The application of the STEAM learning method aims to enable children to absorb and deepen the lessons given at school. Learning the STEAM method has five components, namely: science, technology, engineering, arts, and mathematics. By using these five components, children can be encouraged to explore, solve problems, and make projects and children can have critical thinking skills. The first component in STEAM is science. In this component, the child tries to learn how the world works by doing several steps called the scientific method. With scientific methods, children can make observations, make experiments, make predictions, and discuss (Nurtanto & Sofyan, 2015).

The second component in STEAM is technology. In the technology component is the equipment that children use to play. With technology, children can see cause and effect to solve a problem. The third component in STEAM is engineering. The implementation of this component is needed so that children can understand how and why something works. This activity can start by identifying the problem first and then trying to solve the problem.

The fourth component in STEAM is art. Art elements are used as a means for children to innovate and solve problems creatively. According to Wahyunungsih (2020), children's skills for art-related experiences are influenced by the level of children's development. Conceptually, art education in schools is directed at the acquisition of learning outcomes that have aspects of knowledge, skills, exploration of the mind, and creativity in children. The fifth component in STEAM is mathematics. Early childhood learns early mathematical concepts such as geometry and spatial relationships as they explore new objects with their hands and mouths.

Introducing the STEAM learning method in early childhood can provide opportunities for children to expand their knowledge and develop thinking skills. According to Hastuti (2017), critical thinking is the development of various patterns that help children to gain a deep

understanding so that they can explore their world. Critical thinking skills help children to recognize various problems and how to identify and be able to solve these problems. The concept of critical thinking includes remembering, understanding, applying, analyzing, evaluating, and creating. The manifestation of the application of the STEAM learning method to critical thinking skills is that when the teacher gives a question to the student, the child is encouraged to think because he is challenged to find the answer to the question.

Previous studies have demonstrated the effectiveness of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education in enhancing critical thinking skills among students. For instance, Twiningsih and Elisanti (2021) highlighted that STEAM-based learning media significantly improved both critical thinking abilities and science literacy in early childhood education. Similarly, Rasmani et al. (2020) found that the STEAM method positively impacts classification skills in young learners. However, while these studies emphasize the broader benefits of STEAM, there remains a limited focus on its specific implementation in early childhood settings, particularly in integrating critical thinking skills within daily activities.

In the context of the 21st century, critical thinking has become an essential skill for future readiness. Early childhood is a crucial period for cognitive development, where foundational skills such as critical thinking can be nurtured. However, there is a pressing need to adopt innovative and integrative learning methods like STEAM to meet the developmental and educational demands of this era. The lack of critical thinking skills in early education curricula highlights the urgency of this research to bridge the gap between traditional learning approaches and modern educational needs.

Despite the growing popularity of STEAM education, there is a scarcity of research focusing on its direct application in early childhood education to foster critical thinking skills. Existing studies often emphasize STEAM's impact on older students or its potential benefits broadly. Specific insights into how STEAM can be systematically integrated into daily play-based learning activities for early childhood development are underexplored, creating a significant gap in the literature.

This study introduces a novel perspective by investigating the direct implementation of the STEAM learning method in enhancing critical thinking skills among early childhood learners. By focusing on a specific age group (5-6 years) and exploring the practical application of STEAM principles in a play-based educational setting, the research provides unique insights into aligning developmental theories with modern pedagogical practices.

The objective of this study is to analyze and describe the application of the STEAM learning method in fostering critical thinking skills in early childhood education. Through an in-depth exploration of the implementation process, the research aims to provide a comprehensive understanding of how STEAM can be effectively utilized in early learning environments.

This research contributes to both theory and practice by offering educators actionable strategies for implementing STEAM-based learning in early childhood education. It equips teachers with a framework for fostering critical thinking through integrative activities that engage multiple developmental domains. Additionally, it enriches the academic discourse on early childhood pedagogy by emphasizing innovative learning approaches.

The findings of this study underscore the potential of STEAM education to prepare young learners for future challenges by developing their critical thinking skills early on. The research highlights the importance of integrating interdisciplinary approaches in early education, setting the foundation for lifelong learning and adaptability. Moreover, the study provides policymakers and educators with evidence-based recommendations to reform early childhood curricula, ensuring they align with the demands of the 21st-century educational landscape.

RESEARCH METHOD

The method used in this study is a descriptive qualitative research method. According to (Creswell, 2015) qualitative research is a type of research that explores and understands meaning in a number of individuals or groups of people who come from social problems. Descriptive qualitative research aims to describe, describe, explain, explain, and answer in detail the problems to be studied. The subjects in this study are students of Kindergarten B RA Bina Insani Al-Ma'ruf in Nglaban hamlet, Maron village, Banyakan district with a total of 10 people. This study uses types of observational data collection, in-depth interviews, and documentation.

According to (Sugiyono, 2018), the qualitative research instrument is the researcher himself. This shows that a researcher becomes a tool to record information during the course of the research. Researchers immediately go into the field to find and collect the data needed for research.

RESULTS AND DISCUSSION

The implementation of STEAM learning at RA Bina Insani Al-Ma'ruf is carried out in every children's play activity. This learning involves several aspects of child development that are integrated and fun for children. In STEAM learning activities, teachers act as facilitators and motivators in accordance with the plans that have been prepared. In the use of STEAM learning, teachers have the skills to create a good, interesting atmosphere and the ability to observe the development of children's skills.

In STEAM learning, students are free to pour their ideas into carrying out the learning process. STEAM learning encourages children to construct knowledge about the world around them through observation activities, active questioning, and inquiry (Rachmah et al., 2022, p.3). Children's involvement in STEAM learning can motivate children to improve their critical thinking skills. The goal of STEAM learning is to prepare children to be able to face the milestones of secondary knowledge and 21st century work skills. This is because STEAM learning can help prepare the next generation to face the development of the times. The STEAM learning curriculum involves four skills, namely: creativity, collaboration, communication, and critical thinking. These four skills help children to be able to see problems from a broader and deeper perspective so that they can make the right decisions.

Basically, the application of STEAM learning at RA Bina Insani Al-Ma'ruf has principles based on attitudes, skills and knowledge. The application of STEAM learning has the following steps: 1) Observation step, children carry out observation activities of various phenomena or issues in the environment that are related to science concepts according to the material studied, 2) find ideas, in this step the child thinks of new ideas to be developed, 3) innovate, children can outline what needs to be implemented so that the idea can be applied, 4) Creation steps, children can provide suggestions and opinions from the results of discussions with the group about the ideas applied, 5) get social values, ideas generated by children can provide benefits for social life.

CONCLUSION

The application of STEAM learning in early childhood is part of learning innovations in order to face the current revolutionary era. The STEAM method combines five fields of science in one activity, namely science, technology, engineering, arts, and mathematics. The implementation of STEAM learning at RA Bina Insani Al-Ma'ruf is carried out in every children's play activity. Basically, the application of STEAM learning has principles based on attitudes, skills and knowledge.

REFERENCES

Chintya, C. C. A., & Efendi, N. (2021). The Influence of Expository Learning Methods on Mathematics Learning Results for Class III Students. *Academia Open*, *5*, 10–21070.

Creswell, J. W. (2015). qualitative Research & Research Design, Choose among five approaches. *Yogyakarta: Student Libraries*.

Daulae, T. H. (2019). Langkah-langkah pengembangan media pembelajaran menuju peningkatan kualitas pembelajaran. *Forum Paedagogik*, *10*(1), 52–63.

Degeng, I. N. S. (2021). The Effect of PBL-based STEAM Approach on The Cognitive and Affective Learning Outcomesof Primary School. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(6), 2390–2399.

Hastuti, L. T., Saepudin, E., Cahyana, A. H., Rahayu, D. U. C., Murni, V. W., & Haib, J. (2017). The influence of sun drying process and prolonged storage on composition of essential oil from clove buds (Syzygium aromaticum). *AIP Conference Proceedings*, *1862*(1).

Hsiao, P.-W., & Su, C.-H. (2021). A study on the impact of STEAM education for sustainable development courses and its effects on student motivation and learning. *Sustainability*, *13*(7), 3772.

Karataş, K., & Arpacı, İ. (2021). *The role of self-directed learning, metacognition, and 21st century skills predicting the readiness for online learning*.

Maksum, A., Widiana, I. W., & Marini, A. (2021). Path Analysis of Self-Regulation, Social Skills, Critical Thinking and Problem-Solving Ability on Social Studies Learning Outcomes. *International Journal of Instruction*, *14*(3), 613–628.

MZ, A. B., & Syafi'i, I. (2021). The development of learning media of Islamic education based on flipbook in covid-19 pandemic at elementary school. *Halaqa: Islamic Education Journal*, *5*(1), 43–62.

Nurpratiwiningsih, L., & Setiyoko, D. T. (2018). Development of education games map material as a learning media for elementary school students. *Journal of Primary Education*, *7*(3), 249–257.

Nurtanto, M., & Sofyan, H. (2015). Implementasi problem-based learning untuk meningkatkan hasil belajar kognitif, psikomotor, dan afektif siswa di SMK. *Jurnal Pendidikan Vokasi*, *5*(3), 352–364.

Rasmani, U. E. E., Nurjanah, N. E., & Wahyuningsih, S. (2020). The effect use of STEAM method on the classification ability in objects for children aged 4-5 years. *Journal of Physics: Conference Series*, *1511*(1), 12119.

Sugiyono. (2018). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. CV. Alfabeta.

Twiningsih, A., & Elisanti, E. (2021). Development of STEAM media to improve critical thinking skills and science literacy. *International Journal of Emerging Issues in Early Childhood Education*, *3*(1), 25–34.

Yakman, G. (2018). *STEAM education: An overview of creating a model of integrative education*.