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The Influence of Cooking Class Center on Children's Science Skills at TK Negeri Pembina, Gorontalo City

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ABSTRACT
Young children's science skills remain relatively low due to the lack of direct, experience-based learning approaches. This study aims to examine the effect of cooking class center activities on the science skills of 4–5-year-old children at TK Negeri Pembina, Kota Tengah District, Gorontalo City. The method employed is an experimental approach using a one-group pre-test and post-test design. The research subjects consisted of 17 children in Group A. The results showed a significant improvement in science skills, with the average pre-test score at 16.41 and the post-test score at 31.71. Linear regression analysis yielded a significance value of 0.000 (<0.05), indicating that the alternative hypothesis (H1) is accepted. These findings suggest that the cooking class center is effective in enhancing early childhood science skills. This study contributes to the development of enjoyable, concrete experience-based learning models for young children.

Keywords: Cooking Class Center, Children's Science, Kindergarten

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1. INTRODUCTION

Science skills in early childhood are essential to be developed from an early age, as this stage represents the golden age of development. However, in practice, science learning in early childhood education (ECE) often lacks experimentation and tends to be teacher-centered. Children are frequently given worksheets without active involvement in exploratory activities. This results in low scientific process skills such as observing, classifying, and predicting. One approach believed to be effective in stimulating science skills is through cooking class center activities. In this activity, children not only play but also engage in scientific exploration, such as mixing ingredients, observing changes in matter, and using simple measuring tools. This activity aligns with Piaget's theory of learning through concrete experiences and Vygotsky's theory, which emphasizes the importance of social interaction in learning (Roostin et al, 2019).

Early childhood education is a structured program aimed at creating a joyful learning environment that fosters the development of spiritual strength, personality, intelligence, noble character, and skills required by the child, society, nation, and state. Learning during this stage is optimal as early childhood is a period of rapid growth and development in all aspects. The choice of learning model plays a crucial role in science learning, particularly in experimental activities. The cooking class center is one such learning model that facilitates concept acquisition and experiential learning (Babys, 2022). Children can gain knowledge about healthy food through direct auditory, visual, and tactile experiences. Cooking class is a popular and enjoyable activity often implemented in ECE settings to help children understand simple cooking processes with teacher guidance. It engages children physically and creatively using their hands. Children tend to show enthusiasm when successfully creating something following the teacher's instructions, especially when it involves making food they like.

According to Saepudin (in Azminah, 2023) science is an interconnected set of concepts developed through experiments and observations, which can be further tested and observed. Introducing science to young children should be done through enjoyable and exploratory activities, enabling them to understand the scientific process, thus grasping the cause and effect of the experiments they perform. Science process skills emphasize the process over the product.

Rahardjo (2019) states that introducing science from an early age can inspire children, foster creativity and initiative, and develop logical thinking. Science education emphasizes direct experiences, requiring support in developing process skills that help children explore and understand their environment. Early science learning trains children to use their minds, strengths, and honesty, preparing them for higher education levels. This noble goal aligns with the Republic of Indonesia Law No. 20 of 2003 on the National Education System, Article 1, Clause 14, which states that early childhood education is a development effort aimed at children from birth to six years of age through educational stimulation to support their physical and spiritual growth in preparation for further education. From the theories presented by experts, it can be concluded that science learning emphasizes direct experience. Children need support to develop science skills so they can explore and understand their surroundings. Early science education should prioritize thinking skills to help children construct their own knowledge. Skills suitable for preschool children include observing, classifying, measuring, explaining, questioning, and organizing the results of learning experiences.

Children's learning experiences through observing, imitating, and conducting simple experiments repeatedly in their environment significantly influence their overall potential and intelligence. Therefore, serious efforts are needed to facilitate children during their developmental

stages through educational activities that are age-appropriate, interest-based, and need-driven. Essentially, science is directly related to children through natural processes occurring around them. Science introduction should begin early, using enjoyable activities and repeated routines, allowing children to experience scientific processes firsthand and understand them (Chrismanto, 2024).

Science enables children to conduct simple experiments to understand how and why things happen. The learning model used by educators to enhance children's science skills serves as a tool to achieve educational goals. However, such tools do not always function adequately. The cooking class center can help develop children's science skills through hands-on cooking activities using real ingredients, with results they can enjoy directly (Bhakti, 2015).

The low science skills observed in early childhood are often due to science learning focusing more on coloring and writing on worksheets. Science activities usually involve children only watching while the teacher conducts the experiment, largely due to inadequate teaching media. Previous studies have shown positive outcomes from implementing cooking class activities on children's cognitive and science skills development (Firmawati et al., 2023; Jumaisah, 2022). However, few studies specifically measure the effectiveness of such activities on the science skills of 4–5-year-old children in Gorontalo. This study aims to fill that gap and provide an alternative contextual science learning model.

Initial observations at TK Negeri Pembina in Kota Tengah District, Gorontalo City, revealed issues with children's science skills. Learning activities were predominantly teacher-centered rather than child-centered. The methods used mainly involved lecturing, with limited child engagement. Lessons were heavily focused on worksheets, where teachers explained and asked children to write or color, without opportunities for independent experimentation or activities that stimulate scientific thinking. Science learning was suboptimal, with limited experiments and few opportunities for children to think critically. The research site was selected due to these observed challenges, making it suitable for further study. In Group A, 16 children were enrolled, and 8 of them demonstrated underdeveloped science skills. This was evident from their inability to recognize changes in states of matter or describe experimental outcomes. During lessons, children mostly listened to the teacher, who had limited teaching resources. The teacher rarely gave children the opportunity to express their own ideas, making the learning process teacher-dominated and unengaging.

In recent years, the emphasis on child-centered science education has grown, driven by the understanding that active learning fosters more meaningful engagement and knowledge construction in young children. Children in early childhood settings tend to grasp scientific concepts better when allowed to manipulate materials, ask questions, and reflect on the outcomes of their actions. As noted by Sarkowi et al (2023), active exploration provides opportunities for children to build foundational science process skills such as observing, experimenting, and making predictions. Unfortunately, many early childhood classrooms still prioritize passive learning approaches, often due to limited teacher competence and inadequate learning media.

Contextual science learning through cooking activities is consistent with modern early childhood pedagogy, which advocates integrating multiple domains of development. Cooking not only promotes cognitive growth but also enhances language, motor, and social-emotional skills. According to Laksemi (2024), incorporating science into everyday activities such as cooking enables children to learn scientific principles more easily because the experiences are meaningful and connected to their lives. Cooking class centers provide real, observable changes in ingredients—such as melting, mixing, and temperature change—which naturally lead to discussions about physical and

chemical changes. These sensory-rich experiences help children construct scientific understanding in a concrete, engaging manner.

Another crucial factor in the effectiveness of early science education is the role of the teacher. Teachers act as facilitators who guide children through scientific thinking by prompting them to ask questions, hypothesize, and draw conclusions. As stated by Pakombwele et al. (2022), when teachers intentionally scaffold children's experiences using thoughtful questions and discussions, they enhance the development of children's inquiry-based learning. However, the lack of structured programs and professional development in science for early childhood educators remains a major barrier. Integrating science through cooking class centers offers a promising and practical way to elevate both teacher involvement and children's participation in science learning.

To address these issues, this study proposes implementing the cooking class center as a learning strategy to support and enhance children's science skills. It offers children direct engagement with the learning process, opportunities to explore various objects around them, and helps them better understand scientific phenomena they observe. Children are also introduced to new ingredients and healthy food, contributing to their understanding of nutrition. However, literature reviews and field observations indicate a lack of research focusing specifically on the effectiveness of cooking class centers in developing early childhood science skills, particularly in local contexts such as TK Negeri Pembina in Gorontalo. Most previous studies have focused more on life skills or nutrition rather than scientific thinking or science capabilities. This research seeks to fill that gap by offering a fun and educational alternative approach to improving science skills through contextualized learning.

2. METHOD

The study was conducted at TK Negeri Pembina, Kota Tengah District, Gorontalo City. Before determining the research design, the researcher first established the research method. The method used in this study is the experimental method. Experimental research is employed to investigate the effect of a specific treatment on another variable under controlled conditions. This method allows the researcher to examine the research problem in terms of each variable, both the independent variable (Variable X) and the dependent variable (Variable Y).

The research design used in this study is a one-group pretest-posttest design. This design involves only one group of participants. Within this group, performance tests are conducted as follows: a) conducting a pre-test to assess children's science skills using an observation sheet based on science process skill indicators, b) implementing the intervention in the form of a cooking class center over four sessions. The materials covered include food ingredient recognition, mixing, observation of changes in matter, and liquid volume measurement. c) administering a post-test using the same instrument as the pre-test, d) analyzing the data using descriptive statistics and simple linear regression analysis via SPSS version 23.

Table 1. One-Group Pretest–Posttest Design Diagram

Pre-test	Treatmen	Post test
X1	T	X2

Explanation:

X1 : Pre-test (before treatment): children's science skills before the intervention
X2 : Post-test (after treatment): children's science skills after the intervention
T : Cooking Class Center (treatment/intervention)

3. RESULTS AND DISCUSSION

Description of the Cooking Class Center Intervention

The pre-test results showed that the average science ability score was 16.41, with a minimum score of 10 and a maximum of 20. After the intervention, the post-test average score increased significantly to 31.71, with a score range between 25 and 36. The results of the regression analysis showed a significance value of 0.000 (< 0.05), indicating that the intervention had a statistically significant effect. This activity allowed children to think critically, ask questions, and make predictions.

Children were provided with guidance and support throughout the activity to ensure they followed the steps correctly and had the opportunity to develop their science skills. Through the cooking class center, children learned to integrate cognitive, social, and motor skills while being introduced to science in a fun and meaningful way. The activity also helped build their confidence in exploring their environment.

Description of Pre-Test Results

The pre-test result description provides a summary of the children's initial achievements or knowledge related to science abilities—specifically their skills in observing, classifying, drawing conclusions, communicating, and applying concepts—prior to participating in the cooking class center activity. A pre-test is an evaluative tool administered before instructional content or intervention is given, aiming to capture the baseline understanding, skills, or knowledge of the learners. Based on the calculated scores of the children in Group A at TK Negeri Pembina, Kota Tengah District, Gorontalo City, the researcher found a total score of 279 across 17 children, resulting in an average score of 16.41. The pre-test results showed a total score of 279, with the lowest individual score being 10 and the highest score being 20. The average pre-test score was calculated as follows:

$$Mx = \frac{\sum \times \text{Mx}}{\text{N}} = \frac{279}{17} \quad \text{Mx} = 16.41$$

Description of Post-Test Results

The average pre-test score was previously calculated at 16.41 based on the total score obtained. The post-test was administered after the students received the lesson materials and participated in the cooking class activities, aiming to measure the extent of progress or change that occurred following the intervention. Based on the results of students in Group A at TK Negeri Pembina, Kota Tengah District, Gorontalo City, the total post-test score was 539, with 17 students participating. Thus, the average score found by the researcher was 31.71. The post-test results showed a total score of 539, with the lowest individual score being 25 and the highest score being 35. The calculation of the average score is as follows:

$$Mx = \frac{\sum \times \text{Mx}}{\text{N}} = \frac{539}{17} \quad \text{Mx} = 31{,}71$$

Analysis of Pre-test and Post-test Results on Children's Science Skills

The analysis of the pre-test and post-test results regarding the science skills of children aged 4–5 years shows a clear improvement. Based on the mean scores, there was a notable increase from the

pre-test score of 16.41 to the post-test score of 31.71. This demonstrates that the intervention had a positive impact on children's science abilities. The following figure illustrates the comparison of pre-test and post-test scores:

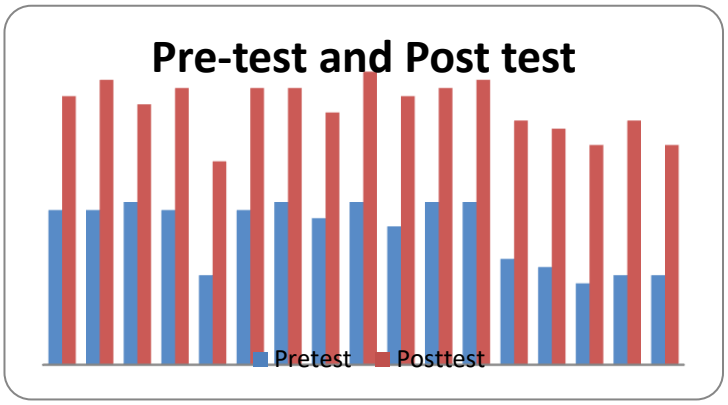

Figure 1. Comparison of Pre-test and Post-test Scores

Figure 1 illustrates the comparison between pre-test and post-test scores of the children's science skills. The figure clearly shows an improvement in post-test scores after the implementation of the cooking class intervention.

Table 2. Descriptive Statistics of Science Skills in Pre-test (Initial Test) and Post-test (Final Test)

Test Type	N	Minimum	Maximum	Sum	Mean
Pre-test	17	10	20	279	16.41
Post-test	17	25	35	539	31.71

The descriptive statistical results in Table 2 confirm the effectiveness of the cooking class center intervention in enhancing children's science abilities, as evidenced by the increase in average scores from the pre-test to the post-test. The table above presents the SPSS 23 output for the pre-test (before treatment) and post-test (after treatment) following the implementation of the cooking class. It includes the mean, standard deviation, minimum, and maximum values for both sets of data.

For the pre-test, the average score (mean) was 16.41. The 95% confidence interval for the lower bound was 14.36. The median score was 19.00, with a maximum of 20 and a minimum of 10. The range of scores was 10, and the interquartile range was 9. The skewness value was -0.627, and the kurtosis was -1.566. In the post-test, the mean score increased to 31.71, with the 95% confidence interval for the lower bound at 30.04. The median score was 33.00, the maximum score was 36, and the minimum was 25. The range was 11, the interquartile range was 5, skewness was 704, and kurtosis was 529.

This study shows that the cooking class center has significant effectiveness in improving the science skills of children aged 4–5 years at TK Negeri Pembina, Kota Tengah District, Gorontalo City. The discussion of the research findings is described based on the main findings related to aspects of children's science abilities, relevant theories, and practical implications. The researcher

obtained data from observations before the cooking class center intervention (pretest) and after the implementation of the cooking class center (posttest).

The results showed an improvement in the science skills of 4–5-year-old children who participated in the cooking class center at TK Negeri Pembina, Kota Tengah District, Gorontalo City. The most developed aspects included: Observation Skills – children were able to recognize differences in cooking ingredients based on color, texture, and smell; Classification Skills – children learned to group food ingredients by type (e.g., dry and wet ingredients); Measuring Skills – children became accustomed to using simple measuring tools such as measuring cups to understand the concept of volume; Prediction Skills – children learned to predict the outcome of a process, such as how dough changes after being cooked; Understanding Cause-and-Effect Relationships – children understood that mixing certain ingredients would result in specific changes (e.g., a mixture of flour and water becomes dough).

This improvement supports the theory that activity-based learning using concrete experiences is more effective in helping children understand science concepts than conventional learning methods. This is in line with Piaget's constructivist theory (Malinda, 2020), which states that children learn through direct experience. According to Azminah et al. (2022), in early childhood education, the introduction of science is not about learning science itself but about how teachers can foster critical thinking, curiosity, accuracy, and exploration to seek answers and logical thinking in children by providing interesting and enjoyable experimental activities. This aligns with the research of Jumaisah (2022), which supports several educational theories, including Piaget's Constructivist Theory. Children aged 4–5 are in the pre-operational stage, where they learn through concrete experiences. The cooking class provides an environment that allows children to explore, experiment, and build their understanding of science concepts. Vygotsky's Theory explains that the cooking class also creates opportunities for learning through social interaction. Children work together in groups, discuss, and receive guidance from the teacher, who functions as a scaffold to support their cognitive development.

These findings are consistent with the research of Firmawati et al (2023), which showed that cooking class activities can improve early childhood science skills through direct experience-based learning. In addition, these results are reinforced by the study of Wijaya et al (2021), which stated that hands-on learning significantly enhances observation and critical thinking skills in children aged 4–6 years. Research by Maharani et al (2022) also emphasized that cooking activities can integrate cognitive, social, and motor aspects that influence children's scientific development. Therefore, the findings of this study strengthen previous findings while providing new evidence in a local context, namely TK Negeri Pembina Kota Tengah, which has not been widely studied before.

Research during the cooking class activities showed children's responses such as: being enthusiastic and actively involved in every activity; showing high curiosity, for example, by asking about the function of ingredients or the cooking process; displaying development in social skills, such as working in groups and sharing tasks. These results indicate that the cooking class not only improves science skills but also supports children's social-emotional development. In line with recent research (Rawanti et al., 2025), center-based learning models have proven to provide enjoyable learning experiences and support children's holistic character development.

Based on the research results, it can be described that the cooking class center has significant effectiveness in improving children's science skills before and after the intervention, as evidenced by the increase in scores obtained: the average science ability score before the intervention was 16.41,

and after the cooking class center intervention was 31.71. This shows a significant increase before and after the intervention. The novelty of this research lies in the implementation of the cooking class method as a science learning strategy for children aged 4–5 years in the context of early childhood education in Gorontalo City, which has rarely been studied. This research contributes to the development of science and technology in the field of early childhood education, particularly in the application of holistic and experience-based learning approaches. Practically, the results of this study are useful for educators and schools in designing learning activities that are both fun and educational to develop children's science skills from an early age.

4. CONCLUSION

Based on the research findings, it can be concluded that the cooking class is effective in improving the science abilities of 4–5-year-old children at TK Negeri Pembina, Kota Tengah District, Gorontalo City. This activity is not only enjoyable but also educational, as it helps develop basic science skills through direct experience. The pre-test data showed a highest score of 20 and a lowest score of 10, with a mean score of 16.41. In contrast, the post-test data revealed a highest score of 36 and a lowest score of 25, with a mean score of 31.71. This indicates that the respondents, who served as the study sample, experienced a notable improvement from the initial test to the final test.

The statistical analysis showed a significance value (2-tailed) of $0.000 < 0.05$, indicating that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. The analysis of pre-test and post-test data revealed a considerable difference in learning outcomes related to children's science abilities. Therefore, the cooking class can be considered an effective method for teaching science to children aged 4–5 years.

This study recommends that early childhood educators adopt more experience-based approaches in science learning. Additionally, this research opens opportunities for the development of other learning center models, such as nature centers or experiment centers, to further enrich early childhood learning experiences.

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