

Development of a Cooking Class Learning Model to Stimulate Fine Motor Skills in Early Childhood Education

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Abstract— Fine motor skill development is an important aspect of early childhood education because it supports children's readiness for learning and daily independence. However, many early childhood learning activities are still dominated by conventional approaches that provide limited opportunities for hands-on experiences. This study aimed to develop and implement a Cooking Class Learning Model to stimulate fine motor skills among children aged 5–6 years. The study employed a quantitative approach using a pre-experimental design conducted at RA Baitul Ibadah, Binjai Barat District, involving 40 children divided into experimental and control classes. Data were collected through observation sheets, pretest-posttest assessments, documentation, and analyzed using descriptive statistics, N-Gain analysis, normality tests, homogeneity tests, and independent sample t-tests. The results showed that the experimental class achieved a higher posttest mean score (37.55) compared to the control class (26.75). The average N-Gain score of the experimental class reached 66.35%, while the control class obtained 29.16%. Hypothesis testing also indicated a significant difference between both groups with a significance value of $0.000 < 0.05$. These findings indicate that the Cooking Class Learning Model effectively improves children's fine motor skills through practical and child-centered learning experiences. Therefore, this model is recommended as an innovative learning approach for early childhood education institutions to support active and experiential learning environments.

Keywords: Early Childhood Education; Cooking Class Learning; Fine Motor Skills; Experiential Learning.

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1. Introduction

Early childhood education plays a strategic role in optimizing children's growth and development during the golden age period. At this stage, children experience rapid physical, cognitive, language, social-emotional, moral, and motor development [1]. One of the most essential aspects that must be stimulated appropriately is fine motor skill development. Fine motor skills involve the coordination of small muscles, particularly hand and finger movements integrated with visual coordination, which are fundamental for writing, drawing, cutting, arranging, and performing various daily activities [2]. Adequate stimulation of fine motor skills in early childhood is important because it contributes to children's readiness for further learning and supports their independence in everyday life [3].

However, the development of fine motor skills among young children remains a challenge in many early childhood education institutions. Learning activities are often dominated by conventional instructional

approaches, such as worksheet-based tasks and teacher-centered activities, which provide limited opportunities for children to engage in direct and meaningful experiences. As a result, many children still experience difficulties in holding writing tools properly, controlling hand movements, coordinating hand-eye movements, and completing manipulative tasks independently [4]. This condition indicates the need for more interactive and experiential learning approaches that actively involve children in meaningful activities [5].

Specifically, preliminary observations conducted at RA Baitul Ibadah, Binjai Barat District, revealed that several children aged 5–6 years still showed limited fine motor abilities. Some children experienced difficulties in controlling writing tools, coloring steadily, imitating shapes, and coordinating hand movements during classroom activities. The learning process also tended to emphasize routine classroom tasks with limited practical activities that could stimulate children's motor coordination optimally. Therefore, an innovative learning model that encourages active participation and hands-on experiences is needed to improve children's fine motor development [6].

One learning activity considered relevant for stimulating fine motor skills is cooking class learning. Cooking class activities provide direct learning experiences through practical tasks such as cutting, mixing, pouring, rolling, arranging, and decorating food ingredients. These activities naturally stimulate hand flexibility, finger strength, hand-eye coordination, and manipulative abilities in children [7]. In addition to enhancing fine motor development, cooking class activities also support creativity, collaboration, communication, independence, and problem-solving skills through enjoyable and contextual learning experiences [8]. Previous studies have shown that cooking activities can significantly improve fine motor skills among young children through active participation and practical learning experiences [9]–[11].

The urgency of this study is closely related to the current demand for innovative and child-centered learning approaches in early childhood education. The implementation of the Merdeka Curriculum emphasizes experiential learning, project-based activities, and the development of children's competencies through meaningful real-life experiences. Therefore, the development of a structured cooking class learning model is considered important to support active learning environments and improve the quality of fine motor stimulation in early childhood education settings. Furthermore, project-based and collaborative learning activities are recognized as effective approaches for supporting children's developmental competencies and active engagement in learning [12], [13].

In addition, previous studies have emphasized that motor competence and fine motor stimulation are closely associated with children's academic readiness, literacy development, executive functioning, and overall developmental performance [14], [15]. Fine motor interventions and perceptual-motor activities also contribute positively to children's writing readiness and learning engagement in early childhood education settings [16]. From a developmental and therapeutic perspective, structured motor activities are considered important to support children's functional independence and participation in learning activities [17]. Furthermore, supportive and engaging learning environments are increasingly needed to address children's developmental and socio-emotional challenges in the post-pandemic educational context [18].

Previous studies on cooking class activities in early childhood education have generally focused on examining the effect of cooking activities on children's fine motor development. Research has also explored cooking interventions, food literacy, and age-appropriate learning activities for children [19], [20]. However, studies that specifically develop cooking class activities into a structured learning model complete with learning syntax, teacher guidelines, implementation procedures, and evaluation instruments are still limited. Therefore, the novelty of this study lies in the development of a Cooking Class Learning Model designed systematically to stimulate fine motor skills in children aged 5–6 years through structured, practical, and child-centered learning stages.

Based on the background above, this study aims to develop a Cooking Class Learning Model to stimulate fine motor skills in early childhood education and to examine the implementation of the model in supporting fine motor development among children aged 5–6 years..

2. Method

2.1 Research Design

This study employed a quantitative approach using a pre-experimental design integrated with the development and initial implementation of a Cooking Class Learning Model for early childhood education. The study focused on designing, implementing, and evaluating a structured cooking class learning model to stimulate fine motor skills among children aged 5–6 years.

The development of the learning model was conducted through several stages, including needs analysis, model design, implementation, and evaluation. The model was designed based on hands-on learning and experiential learning approaches that emphasize children’s active participation in practical classroom activities. The syntax of the Cooking Class Learning Model developed in this study is presented in Figure 1.

The model was implemented through several cooking activities, including making corn cheese milk (jasuke), rolled bread, banana compote, and fruit satay. These activities were selected because they involve manipulative movements that can stimulate children’s fine motor coordination through cutting, mixing, pouring, arranging, and decorating activities.

2.2 Participants and Research Setting

This study was conducted at RA Baitul Ibadah, Binjai Barat District, Indonesia, during the 2024/2025 academic year. The participants consisted of 40 children aged 5–6 years divided into two groups:

1. 20 children in the experimental class, and
2. 20 children in the control class.

The experimental class participated in learning activities using the Cooking Class Learning Model, while the control class received conventional learning activities commonly implemented in the classroom.

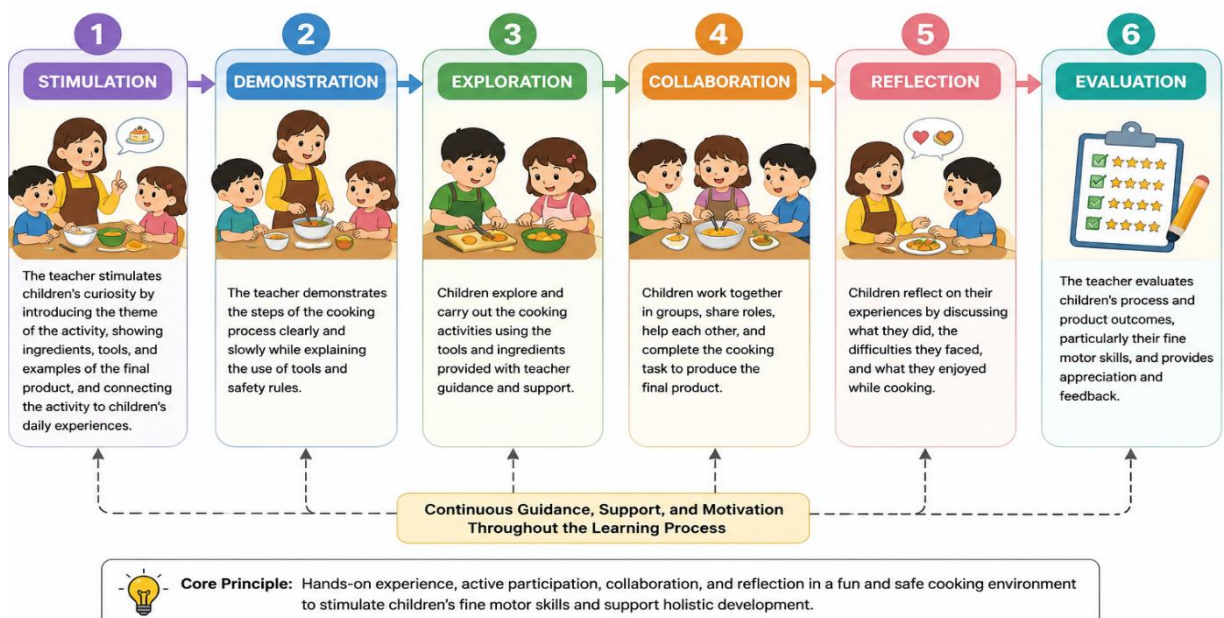


Figure 1. Syntax of the Cooking Class Learning Model

2.3 Learning Procedures

The implementation of the Cooking Class Learning Model was carried out in several stages. At the beginning of the learning process, the teacher introduced food ingredients, learning tools, and safety rules to the children. The teacher then demonstrated the cooking procedures before allowing children to practice independently in groups.

During the implementation stage, children were actively involved in practical activities such as cutting fruits, mixing ingredients, pouring liquids, arranging food decorations, and presenting their work. The learning activities emphasized direct experience, collaboration, and active participation. The procedures of the cooking class activities implemented in this study are summarized in Table 1.

Table 1. Cooking Class Activities Implemented in the Study

Activity	Fine Motor Stimulation
Making Jasuke	Pouring, mixing, sprinkling cheese
Making Rolled Bread	Rolling, cutting, arranging fillings
Making Banana Compote	Stirring, pouring, cutting
Making Fruit Satay	Skewering, arranging, decorating

2.4 Research Instrument

The instrument used in this study was an observation sheet for assessing children’s fine motor skills. The instrument consisted of several indicators related to children’s ability to:

1. use writing tools properly;
2. control hand movements;
3. coordinate hand movements with visual direction;
4. imitate shapes and letters; and
5. connect points into patterns or shapes.

The assessment used a four-point rating scale ranging from:

- 1 = not yet developed,
- 2 = developing with assistance,
- 3 = developing appropriately, and
- 4 = developing very well.

The indicators of fine motor skill assessment are presented in Table 2.

Table 2. Indicators of Fine Motor Skill Assessment

No	Indicator
1	Ability to use tools properly
2	Ability to control hand movements
3	Ability to coordinate hand movements
4	Ability to imitate shapes and letters
5	Ability to connect points and patterns

2.5 Data Collection Technique

Data were collected through observation and performance assessment during pretest and posttest activities. Pretest was conducted before the implementation of the Cooking Class Learning Model to identify children’s initial fine motor abilities. Posttest was conducted after the implementation of the learning activities to examine improvements in fine motor development. Documentation techniques were also used to support observational findings during the implementation process.

2.6 Data Analysis

The collected data were analyzed quantitatively using descriptive and inferential statistical analysis. Descriptive statistics were used to determine the mean scores, standard deviation, minimum scores, and maximum scores of children’s fine motor development.

The effectiveness of the Cooking Class Learning Model was analyzed using N-Gain analysis to measure the improvement in children’s fine motor skills between pretest and posttest scores. Before hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met the statistical assumptions.

Furthermore, an independent sample t-test was conducted to determine whether there was a significant difference between the experimental class and the control class after the implementation of the learning model. Statistical analysis in this study was conducted using SPSS software.

3. Result and Discussion

3.1 Development of the Cooking Class Learning Model

The Cooking Class Learning Model developed in this study was designed to provide meaningful and hands-on learning experiences for children aged 5–6 years. The model emphasizes active participation through cooking activities that stimulate fine motor coordination, creativity, collaboration, and independence. The development process was based on classroom needs analysis and observations of children’s fine motor difficulties during learning activities.

As previously explained in the methodology section, the model consists of six learning stages, namely stimulation, demonstration, exploration, collaboration, reflection, and evaluation. These stages were designed systematically to support children’s engagement during the learning process. Figure 1 illustrates the syntax of the Cooking Class Learning Model implemented in this study.

3.2 Implementation of the Cooking Class Learning Model

The implementation of the model was carried out through four cooking activities, namely making jasuke, rolled bread, banana compote, and fruit satay. Each activity involved manipulative movements that stimulated children’s fine motor abilities, such as cutting, pouring, stirring, arranging, and decorating food ingredients.

During the learning process, children showed enthusiasm and active participation in completing the cooking activities. The use of real objects and practical activities encouraged children to explore learning materials directly and collaboratively with their peers. The teacher acted as a facilitator who guided children throughout the learning process while allowing them to perform activities independently.

The types of cooking activities and the stimulated fine motor skills are presented in Table 3.

Table 3. Cooking Activities and Fine Motor Skill Stimulation

Cooking Activity	Learning Activities	Stimulated Fine Motor Skills
Jasuke	Pouring milk, mixing corn, sprinkling cheese	Hand coordination and finger flexibility
Rolled Bread	Rolling bread, cutting bananas, arranging fillings	Finger control and hand coordination
Banana Compote	Stirring ingredients and pouring liquids	Wrist flexibility and movement stability

Fruit Satay	Cutting fruits, skewering, decorating	Hand-eye coordination and precision
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The implementation results indicated that children were more engaged during practical learning activities compared to conventional classroom instruction. The cooking class activities provided opportunities for children to interact directly with learning materials while improving their manipulative skills naturally through enjoyable experiences.

3.3 Descriptive Analysis of Fine Motor Skills

The descriptive statistical results showed an improvement in children’s fine motor skills after the implementation of the Cooking Class Learning Model. The experimental class demonstrated higher posttest scores compared to the control class.

The comparison of pretest and posttest mean scores between the experimental and control classes is presented in Table 4.

Table 4. Comparison of Pretest and Posttest Scores

Class	Pretest Mean	Posttest Mean
Experimental	23.8	37.55
Control	19.3	26.75

Table 4 shows that the experimental class experienced a substantial increase in fine motor skill scores after participating in the cooking class learning activities. Meanwhile, the control class also showed improvement, although the increase was lower compared to the experimental class.

The improvement in the experimental class indicates that cooking class activities contributed positively to children’s fine motor development. Practical activities such as cutting, mixing, arranging, and decorating food ingredients stimulated children’s finger movements and hand coordination more intensively than conventional classroom activities.

3.4 N-Gain Analysis

To determine the effectiveness of the Cooking Class Learning Model, N-Gain analysis was conducted to measure the improvement in children’s fine motor skills between pretest and posttest scores. The results of the N-Gain analysis are summarized in Table 5.

Table 5. N-Gain Analysis Results

Class	Mean N-Gain (%)	Category	Minimum Score	Maximum Score	Standard Deviation
Experimental	66.35	Moderate–High	4.76	95	21.33
Control	29.16	Low	6.67	58.33	13.87

As shown in Table 5, the experimental class obtained a higher average N-Gain score (66.35%) compared to the control class (29.16%). These findings indicate that the Cooking Class Learning Model was more effective in improving children’s fine motor skills than conventional learning activities.

The higher N-Gain score in the experimental class demonstrates that hands-on learning activities can provide meaningful stimulation for fine motor development. Children actively used their fingers, wrists, and hand muscles during the cooking process, which contributed to better coordination and movement

control.

3.5 Normality and Homogeneity Test

Before conducting hypothesis testing, normality and homogeneity tests were carried out to ensure that the data met statistical assumptions. The results of the normality and homogeneity tests are presented in Table 6.

Table 6. Normality and Homogeneity Test Results

Test	Sig. Value	Interpretation
Experimental Class Normality	0.05	Normal
Control Class Normality	0.26	Normal
Homogeneity Test	0.622	Homogeneous

Table 6 indicates that the data were normally distributed and homogeneous because all significance values were greater than 0.05. Therefore, the data fulfilled the assumptions required for hypothesis testing using an independent sample t-test.

3.6 Hypothesis Testing

Hypothesis testing was conducted using an independent sample t-test to examine whether there was a significant difference between the experimental and control classes after the implementation of the Cooking Class Learning Model. The t-test results are presented in Table 7.

Table 7. Independent Sample t-Test Results

Variable	Levene's Test Sig.	t-value	df	Sig. (2-tailed)	Mean Difference	Interpretation
Fine Motor Skills	0.622	6.547	38	0	39.4	Significant Difference

Table 7 shows that the significance value was 0.000, which is lower than 0.05. This result indicates that there was a significant difference between the experimental and control classes. Therefore, the Cooking Class Learning Model significantly improved children's fine motor skills.

The findings of this study support the idea that experiential and activity-based learning can enhance children's motor development more effectively than conventional learning methods. Cooking activities encourage children to manipulate objects directly, strengthen finger muscles, improve coordination, and develop movement precision through enjoyable and meaningful learning experiences.

In addition, the implementation of cooking class activities aligns with child-centered learning principles in early childhood education. The activities provide opportunities for exploration, creativity, collaboration, and independent learning while supporting the implementation of active learning approaches in the classroom.

The novelty of this study lies not only in examining the effect of cooking activities on fine motor development but also in developing a structured Cooking Class Learning Model complete with learning syntax, implementation procedures, and teacher guidance for early childhood education contexts.

4. Conclusion

This study developed and implemented a Cooking Class Learning Model to stimulate fine motor skills in

early childhood education. The model was designed through structured learning stages consisting of stimulation, demonstration, exploration, collaboration, reflection, and evaluation. The implementation of the model through practical cooking activities provided meaningful and hands-on learning experiences for children aged 5–6 years.

The findings revealed that the Cooking Class Learning Model effectively improved children's fine motor skills. This result was indicated by the increase in posttest scores and the higher N-Gain percentage in the experimental class compared to the control class. Statistical analysis also demonstrated a significant difference between children who participated in the cooking class learning activities and those who received conventional learning instruction.

The implementation of cooking class activities encouraged children to actively engage in manipulative movements such as cutting, pouring, stirring, arranging, and decorating food ingredients. These activities contributed to the development of hand-eye coordination, finger flexibility, movement precision, and children's independence during the learning process.

In addition, this study contributes to early childhood education by developing a structured Cooking Class Learning Model that can be practically implemented by teachers in classroom learning activities. The model supports active, child-centered, and experiential learning approaches aligned with the principles of the Merdeka Curriculum and project-based learning in early childhood education.

Therefore, the Cooking Class Learning Model can be considered an innovative learning alternative to support fine motor stimulation and improve the quality of learning experiences for young children. Future studies are recommended to implement the model in broader educational settings and integrate additional developmental aspects such as creativity, social interaction, and early science learning.

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