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Improving Early Literacy Skills of Children Aged 4–5 Years through Project-Based Learning Using the "Snack Ball" Project

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ABSTRACT

Early literacy is a foundational component of children's language and literacy development and needs to be fostered through meaningful, contextual, and developmentally appropriate experiences. This classroom action research aimed to improve the early literacy skills of children aged 4–5 years through Project-Based Learning (PjBL) using the *Snack Ball* project at TK ABA 3 Sumbersari. The study involved 16 children in Group A and was conducted in two cycles, with two meetings in each cycle, following the planning, action, observation, and reflection stages. Data were collected through observation, documentation, and performance assessment using five indicators: recognizing letter symbols, connecting sounds with letter symbols, recognizing initial letters, enriching vocabulary, and writing initial letters. The data were analyzed descriptively using percentage achievement and qualitative interpretation of learning processes. The

proportion of children reaching the BSH and BSB categories increased from 50.00% in Cycle I to 81.25% in Cycle II, while the BB category decreased from 18.75% to 0%. These findings indicate that PjBL through the contextual *Snack Ball* project can support early literacy development by connecting letter knowledge, oral language, concrete objects, interaction, and children's direct experiences. The contribution of this study lies in positioning the project not merely as a product-making activity but as an integrated context for early literacy learning.

Introduction

Early literacy is an essential foundation for children's literacy development, encompassing their ability to understand the relationships among oral language, sounds, printed symbols, vocabulary, and language experiences. At the age of 4–5 years, these abilities develop gradually through meaningful interactions with adults, peers, objects, and environments rich in language and symbols. Therefore, fostering early literacy in early childhood education should be distinguished from the formal reading and writing demands of elementary school. This study does not focus on formal reading proficiency but rather on five observable, developmentally appropriate skills: recognizing letter symbols, associating sounds with letter symbols, identifying the initial letters of words, expanding vocabulary, and writing the initial letters of object names (Whitehurst & Lonigan, 1998; Akyol et al., 2022).

Theoretically, this study is grounded in constructivism, which views children as active constructors of knowledge through direct experiences and interactions with their environment. Within the context of the *Snack Ball* project, children not only observe letter symbols but also handle and examine objects, name them, identify their initial sounds, match sounds with corresponding symbols, and attempt to write their initial letters. Thus, abstract letter concepts are embedded in concrete experiences that children can observe and interpret. This perspective can also be explained through Vygotsky's social constructivism, particularly through social interaction, dialogue, and teacher scaffolding when children are not yet able to complete tasks independently (Piaget, 1952; Vygotskij & Cole, 1981).

Previous research by Christin Souisa et al. (2024) demonstrated that implementing Project-Based Learning (PjBL) can enhance children's active engagement through exploration, collaboration, and contextual project completion. By emphasizing developmentally appropriate, play-based projects, children can construct knowledge more effectively through direct experiences. These findings are supported by Junaedah et al. (2024), who explained that PjBL facilitates the implementation of the *Kurikulum Merdeka* (Independent Curriculum) by providing opportunities for children to develop creativity, communication, critical thinking, and independent learning in an integrated manner. Meanwhile, a systematic review by Bautista et al. (2024) emphasized

that early literacy development can be more effectively supported when children participate in authentic, collaborative, and meaningful learning experiences rather than relying solely on mechanical reading and writing exercises. Collectively, these studies suggest that PjBL contributes positively to various aspects of early childhood development. However, previous research has predominantly focused on creativity, critical thinking, implementation of the *Kurikulum Merdeka*, or literacy development in general. Consequently, further empirical investigation is needed into the integration of Project-Based Learning to develop multiple components of early literacy among children aged 4–5 years.

Although previous studies have demonstrated the potential of Project-Based Learning (PjBL) to enhance engagement, communication, creativity, and learning experiences in early childhood education, several research gaps remain regarding its specific application to early literacy. First, many studies on PjBL in early childhood education emphasize children's engagement or general developmental outcomes, while the relationships between project stages and specific early literacy indicators are not always operationally explained. Second, early literacy research frequently employs instructional media or activities that focus on recognizing written symbols separately, providing limited descriptions of how children use these symbols in authentic experiences. Third, further classroom action research is needed to demonstrate how

reflections from the first cycle can inform improvements in scaffolding strategies and activity design in subsequent cycles. These gaps provide the foundation for the present study, which aims to examine and describe improvements in classroom learning through the *Snack Ball* project (Christin Souisa et al., 2024; Junaedah et al., 2024; Sadaruddin et al., 2025).

To address these gaps, the study was conducted at TK ABA 3 Sumbersari with Group A, consisting of 16 children, including 7 boys and 9 girls. Preliminary observations indicated that the children's early literacy skills had not yet developed optimally. These initial conditions informed the design of an intervention aimed not only at improving assessment scores but also at enhancing the quality of children's learning experiences. Specifically, this study aims to improve the early literacy skills of children aged 4–5 years through Project-Based Learning using the *Snack Ball* project and to describe changes in the learning process from Cycle I to Cycle II.

Based on these considerations, this study introduces a learning approach that integrates Project-Based Learning (PjBL) through the *Snack Ball* project as an authentic learning experience to develop the early literacy skills of children aged 4–5 years. The novelty of this study lies not merely in using *Snack Ball* as a learning medium but in employing the project as a literacy-rich context that connects concrete objects, vocabulary, initial sounds, letter symbols, social interactions,

and writing activities within an integrated learning sequence. From this perspective, the *Snack Ball* project serves as a pedagogical context for integrating early literacy indicators rather than merely producing a final product.

The implementation of the project involves five interconnected literacy activities: (1) introducing letters through ingredient labels and illustrated recipe cards displaying initial letters; (2) developing sound recognition by naming objects and emphasizing their initial sounds; (3) expanding vocabulary through conversations about the tools and ingredients used; (4) recognizing initial letters by matching object names with corresponding letter symbols; and (5) practicing writing initial letters on worksheets after children have engaged in concrete learning experiences. These activities are designed to guide children progressively from interactions with real objects to oral language and, ultimately, to written symbols.

Methods

This study employed Classroom Action Research (CAR) to improve the quality of the learning process and enhance children's early literacy skills through Project-Based Learning (PjBL). Classroom Action Research was selected because it allows for the continuous identification of learning problems, action planning, implementation, observation, and reflection. The research design followed the Kemmis and McTaggart action research model, which consists of four stages:

planning, acting, observing, and reflecting. In this study, the reflection conducted after Cycle I served as the basis for improving the intervention in Cycle II. Consequently, changes in learning outcomes were examined not only through differences in achievement percentages but also in relation to modifications in instructional strategies.

The study was conducted in two cycles, each consisting of two meetings. During the planning stage, the researcher prepared PjBL-based teaching modules, assessment instruments, observation sheets for teacher and children's activities, letter cards, word cards, materials for the *Snack Ball* project, and documentation tools. During the action stage, the teacher implemented learning activities through guiding questions, project planning, project implementation, monitoring, presentation of project outcomes, and reflection. Literacy activities were integrated into each project stage based on the five indicators established in the study. The observation stage involved using observation sheets to document instructional implementation, children's engagement, and the development of early literacy skills. Reflection was conducted collaboratively with the classroom teacher to identify challenges and determine improvements for the subsequent cycle. Details of the modifications resulting from the Cycle I reflection are presented in the Results section.

Data were collected through observation, documentation, and

performance assessment. Observations were conducted collaboratively by the researcher and the classroom teacher to monitor the development of children's early literacy skills throughout the *Snack Ball* project. Assessments were administered at each meeting, and the results were summarized at the end of each cycle, while baseline abilities were identified through pre-cycle assessments. Documentation included photographs of learning activities, children's work, teaching modules, and field notes. The use of multiple data collection techniques enabled continuous assessment of children's development while supporting instructional improvements based on observational findings (Black & Wiliam, 2009; Mertler, 2024).

The research instruments consisted of observation sheets for teacher and children's activities, an early literacy assessment rubric, field notes, and learning documentation. The assessment rubric was developed based on five indicators: recognizing letter symbols, associating sounds with letter symbols, identifying the initial letters of words, expanding vocabulary, and writing the initial letters of object names. These indicators were aligned with the *Early Childhood Education Learning Outcomes for the Foundation Phase* (*Capaian Pembelajaran PAUD Fase Fondasi*), which emphasize the development of early literacy through meaningful learning experiences (Yuliantina et al., 2025). Each indicator was assessed using four developmental categories: Not Yet Developed (*Belum Berkembang*, BB), Beginning to Develop (*Mulai*

Berkembang, MB), Developing as Expected (*Berkembang Sesuai Harapan*, BSH), and Developing Very Well (*Berkembang Sangat Baik*, BSB).

Data trustworthiness was strengthened through methodological and source triangulation. Methodological triangulation involved comparing observation results, documentation, and performance assessments, while source triangulation involved examining the researcher's field notes, information provided by the classroom teacher, and evidence of children's developmental progress. The researcher and classroom teacher also conducted reflections at the end of each cycle to evaluate findings and plan improvements to subsequent actions. These procedures were consistent with the principles of establishing trustworthiness and interpretive consistency in qualitative research (Creswell & Poth, 2024; Denzin & Lincoln, 2018).

Data were analyzed using descriptive quantitative and qualitative approaches. Quantitative analysis was conducted by calculating the percentage of children who achieved the BSH and BSB categories in each cycle using the following formula:

$$P = (f / N) \times 100\%$$

Where *P* represents the percentage of achievement, *f* refers to the number of children who met the success criteria, and *N* represents the total number of children. Meanwhile, qualitative analysis involved data condensation, data display, and conclusion drawing based on observation notes, children's engagement, teacher scaffolding, and

changes in instructional strategies across cycles (Miles et al., 2019).

The success of the intervention was determined based on outcome and process indicators. The outcome indicator was considered achieved when at least 75% of the children obtained a minimum score of 3, corresponding to the Developing as Expected (BSH) category, in the early literacy assessment. Meanwhile, the process indicators included the implementation of project-based learning at a good performance level and children's active engagement throughout the learning activities. The research cycles were terminated when both indicators were achieved, in accordance with the principles of Classroom Action Research, which emphasize reflective improvements in both learning processes and outcomes (McNiff, 2013).

Result and Discussions

Initial Conditions of Children's Early Literacy Skills (Pre-Cycle)

The study was conducted during the second semester of the 2025/2026 academic year at TK ABA 3 Sumbersari, involving 16 children aged 4–5 years in Group A, consisting of 7 boys and 9 girls. This classroom action research was implemented in two cycles using Project-Based Learning (PjBL) through the *Snack Ball* project to improve children's early literacy skills. The classroom teacher was responsible for implementing the learning activities, while the researcher participated in planning, observation, assessment, documentation, and reflection.

The pre-cycle assessment was conducted to identify the children's initial

abilities before implementing PjBL. The assessment results indicated that most children had not yet achieved the expected developmental level, as presented in Table 1.

Table 1. Distribution of Children's Early Literacy Skills in the Pre-Cycle

Developmental Category	Score	Number of Children	Percentage
Not Yet Developed (BB)	1	3	18.75%
Beginning to Develop (MB)	2	9	56.25%
Developing as Expected (BSH)	3	4	25.00%
Developing Very Well (BSB)	4	0	0.00%
Total		**16**	**100%**

As shown in Table 1, 12 children (75%) were classified in the BB and MB categories, while only 4 children (25%) had reached the BSH category. The mean classroom score of 2.06 indicated that the children's early literacy skills were generally at the Beginning to Develop level. Classroom observations also revealed that literacy activities primarily involved letter cards, line tracing, and copying exercises. Consequently, the relationships among letter symbols, sounds, vocabulary, and concrete objects had not yet been developed in an integrated manner.

Based on these initial conditions, the *Snack Ball* project was selected as a

learning context that connected hands-on experiences with early literacy development. Through the introduction of ingredients and tools, such as bananas, dates, oats, and cocoa powder, children were provided with opportunities to name objects, recognize initial sounds and letters, expand their vocabulary, and attempt to write letter symbols. This approach aligns with early childhood education principles that emphasize concrete experiences, active interaction, and play-based activities as essential components of learning (Darling-Hammond et al., 2020; Kemendikbudristek, 2022).

Implementation of Project-Based Learning through the Snack Ball Project

Project-based learning was implemented by adapting six PjBL stages: identifying essential questions, designing the project, developing a schedule, monitoring implementation, presenting project outcomes, and conducting reflection (Larmer et al., 2015). These stages were adjusted to the developmental characteristics of children aged 4–5 years through simple questions, play-based activities, concrete materials, and teacher scaffolding. This adaptation prioritized children's learning experiences rather than merely completing the final project product (Sadaruddin et al., 2025).

During the initial stage, the teacher introduced the ingredients used to make *Snack Balls* and asked guiding questions, such as "What is the

name of this ingredient?" and "What letter does the word 'pisang' (banana) begin with?" These questions were intended to activate children's prior knowledge, expand their vocabulary, and direct their attention to the relationship between sounds and letter symbols.

Next, the teacher and children collaboratively planned the activities, identified the ingredients and tools, and organized the steps for preparing *Snack Balls*. During project implementation, children worked in groups to observe, mix, and shape the ingredients. Early literacy activities were integrated by encouraging children to name objects, use letter cards or labels, recognize initial sounds, and write initial letters on the worksheets provided.

During the monitoring stage, the teacher provided assistance according to the children's developmental needs. This support included modeling, repeating initial sounds, using letter cards, and guiding children in connecting object names with written symbols. Children who had already understood the activities were also encouraged to interact with and assist their peers.

Upon completing the project, children presented their work by describing the ingredients, preparation steps, and experiences gained. The teacher subsequently encouraged them to reflect on the activities while reviewing the vocabulary and letter symbols introduced during the project. These learning experiences provided opportunities for

children to develop early literacy through concrete experiences, communication, and social interaction, consistent with constructivist and emergent literacy perspectives (Piaget, 1952; Vygotsky, 1981; Whitehurst & Lonigan, 1998).

Early Literacy Skills in Cycle I

The implementation of Cycle I demonstrated improvements in children's early literacy skills compared with the pre-cycle conditions. Children began actively participating in activities involving naming ingredients, recognizing letter symbols, and associating initial sounds with object names. The Cycle I assessment results are presented in Table 2.

Table 2. Distribution of Children's Early Literacy Skills in Cycle I

Developmental Category	Number of Children	Percentage
Not Yet Developed (BB)	3	18.75%
Beginning to Develop (MB)	5	31.25%
Developing as Expected (BSH)	5	31.25%
Developing Very Well (BSB)	3	18.75%
Total	**16**	**100%**

As presented in Table 2, 8 children (50%) achieved the BSH and BSB

categories, an increase from 4 children (25%) in the pre-cycle assessment. However, 8 children (50%) remained in the BB and MB categories. These results indicated that the intervention in Cycle I had not yet achieved the predetermined classical success criterion of 75%.

Observational findings indicated that some children still required teacher assistance in recognizing initial letters, associating sounds with symbols, and communicating their project experiences. Therefore, the Cycle I reflection focused on strengthening instructional support strategies by simplifying guiding questions, providing clearer examples of initial sounds, using more easily recognizable letter cards or labels, and increasing opportunities for children to complete activities independently. These improvements provided the basis for implementing the intervention in Cycle II.

Early Literacy Skills in Cycle II

Cycle II was implemented by incorporating the findings from the reflection conducted in the previous cycle. The learning activities continued to employ the *Snack Ball* project, with greater emphasis on initial-letter stimulation, language interaction, and gradual instructional support according to children's developmental needs. The assessment results demonstrated further improvements, as presented in Table 3.

Table 3. Distribution of Children's Early Literacy Skills in Cycle II

Developmental Category	Number of Children	Percentage
Not Yet Developed (BB)	0	0.00%
Beginning to Develop (MB)	3	18.75%
Developing as Expected (BSH)	7	43.75%
Developing Very Well (BSB)	6	37.50%
Total	**16**	**100%**

As shown in Table 3, 13 children (81.25%) achieved the BSH and BSB categories, while 3 children (18.75%) remained in the MB category. No children were classified in the BB category. This achievement represented an increase of 31.25 percentage points compared with Cycle I and exceeded the predetermined classical success criterion of 75%.

Observational findings indicated improvements in children's engagement in activities involving identifying ingredient names, recognizing initial letters, using vocabulary, and communicating throughout the project. These findings suggest that instructional improvements implemented in Cycle II were accompanied by increased early literacy achievement. As the outcome success criterion had been met, the research was concluded at the end of Cycle II.

Analysis of Improvements in Children's Early Literacy Skills

A comparison of the pre-cycle, Cycle I, and Cycle II results revealed

changes in the distribution of children's early literacy skills following the implementation of PjBL through the *Snack Ball* project.

Table 4. Comparison of Children's Early Literacy Skills across Research Stages

Developmental Category	Pre-Cycle	Cycle I	Cycle II
BB	3 (18.75%)	3 (18.75%)	0 (0.00%)
MB	9 (56.25%)	5 (31.25%)	3 (18.75%)
BSH	4 (25.00%)	5 (31.25%)	7 (43.75%)
BSB	0 (0.00%)	3 (18.75%)	6 (37.50%)
BSH + BSB	**4 (25.00%)**	**8 (50.00%)**	**13 (81.25%)**

As presented in Table 4, the proportion of children achieving the BSH and BSB categories increased from 25% in the pre-cycle assessment to 50% in Cycle I and 81.25% in Cycle II. Overall, this represented an increase of 56.25 percentage points from the initial conditions. These changes indicate improvements in learning outcomes associated with the implementation and refinement of instructional interventions.

These improvements can be understood through the characteristics of the *Snack Ball* project, which integrated concrete experiences with literacy activities. Children not only recognized letter shapes but also connected them with object names, initial sounds, vocabulary, and

written symbols. These experiences align with the theory of emergent literacy, which emphasizes oral language, letter knowledge, and phonological awareness as interconnected components of early literacy development (Whitehurst & Lonigan, 1998).

These findings are also consistent with the constructivist perspectives of Piaget and Vygotsky, which emphasize the importance of direct experiences and social interactions in knowledge construction. The use of concrete objects enables children to connect abstract concepts with real experiences, while dialogue, collaborative activities, and teacher scaffolding help children complete tasks according to their developmental abilities (Piaget, 1952; Vygotsky, 1981). In this study, these processes were reflected in activities involving observing ingredients, naming objects, recognizing initial letters, and attempting to write them with teacher assistance.

The findings are consistent with those of Christin Souisa et al. (2024), who demonstrated that project-based learning provides opportunities for children to develop knowledge and problem-solving skills through direct learning experiences. Similarly, Sadaruddin et al. (2025) emphasized the importance of planning, implementing, and evaluating PjBL in accordance with the developmental characteristics of young children. These similarities highlight the relevance of project activities as a context for active learning. However, the present study specifically focused on five measurable indicators of early literacy development.

The contribution of this study lies in integrating the *Snack Ball* project with early literacy stimulation through concrete objects, vocabulary development, initial sound recognition, letter symbols, and writing activities within a single learning sequence. Letter cards and worksheets were retained as supplementary instructional materials but were incorporated into contextual project activities. Furthermore, reflection between cycles enabled the teacher to adjust instructional support strategies according to children's developmental needs.

From a practical perspective, these findings indicate that early childhood educators can utilize simple projects related to children's everyday experiences to achieve measurable literacy learning objectives. Nevertheless, because the study was limited to a single classroom without a comparison group, the observed improvements should be interpreted as evidence of enhanced instructional practices within the research context rather than definitive proof that PjBL is superior to all other instructional approaches.

Conclusion

The findings of this study demonstrate that the implementation of Project-Based Learning (PjBL) through the *Snack Ball* project improved the early literacy skills of children aged 4–5 years at TK ABA 3 Sumbersari. The proportion of children achieving the Developing as Expected (BSH) and Developing Very Well (BSB) categories increased from 25% in the pre-cycle assessment to 50% in Cycle I and 81.25% in

Cycle II, exceeding the predetermined success criterion of 75%. Project-based learning provided contextual learning experiences through interactions with concrete objects, vocabulary development, recognition of letter sounds and symbols, and writing activities supported by social interaction and teacher scaffolding.

These findings suggest that contextual projects can serve as an alternative instructional strategy for developing early literacy skills in early childhood education. However, this study was limited to a single classroom involving 16 children and two intervention cycles without a comparison group. Therefore, future research is recommended to involve larger samples, diverse learning contexts, and more detailed analyses of children's progress across individual early literacy indicators to strengthen the findings.

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