

Implementation of Deep Learning in Project Based Learning on Early Childhood Independence

Made Vina Arie Paramita ¹, Rendy Setyowahyudi ², Ni Putu Vivin Indrawati ³, Rizky Drupadi ⁴

¹ Universitas Pendidikan Ganesha, Indonesia; vina.arie@undiksha.ac.id

² Universitas Pendidikan Ganesha, Indonesia; rendy@undiksha.ac.id

³ Universitas Pendidikan Ganesha, Indonesia; pt.vivin@undiksha

⁴ Universitas Lampung, Indonesia; rizky.drupadi@fkip.unila.ac.id

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Abstract

Independence in early childhood is an important aspect of character development and life skills that need to be developed from an early age. However, in practice, children's independence has not yet been optimally developed. This study aims to analyze the level of implementation of deep learning in project-based learning in early childhood education and its relation to children's independence. This study employed a qualitative approach. Data were collected through in-depth interviews with early childhood education teachers in Buleleng Regency, as well as observation questionnaires to assess children's independence. There were six teachers interviewed and 20 children observed to strengthen the data. The results showed that children were able to demonstrate independent behavior across various indicators, namely learning initiative, responsibility, decision-making, discipline and time management, as well as perseverance during project activities. Several challenges in implementing Deep Learning in Project-Based Learning (PjBL) were identified, including differences in teachers' understanding of the Deep Learning concept, limited instructional time, lack of contextual learning media and resources, uneven parental involvement, and the characteristics of early childhood learners who still require intensive guidance. Several contextual strategies were implemented, such as the use of projects based on daily activities, the provision of open-ended questions and simple reflections, the utilization of the surrounding environment as a learning resource, collaboration with parents, and the gradual application of scaffolding according to children's developmental needs.

Keywords

Deep Learning; Project Based Learning; Independence; Early Childhood

Corresponding Author

Made Vina Arie Paramita

Universitas Pendidikan Ganesha, Indonesia; vina.arie@undiksha.ac.id

1. INTRODUCTION

Independence is an important aspect of early childhood development that contributes to the formation of character and life skills. Independence in early childhood includes the ability to carry out daily activities without depending on others, which is believed to develop through appropriate learning experiences and adequate stimulation from the environment, especially from parents and educators (Drupadi & Ayriza, 2020; N. V. Indrawati et al., 2025; Melinda & Suwardi, 2021). However, there are still many children who show a high level of dependence on parents and educators, so independence has not developed optimally. This condition indicates the need for learning approaches that can encourage children to be more active, independent, and involved in the learning process. In the indicators of independence, many children are still in the "beginning to develop" category in terms of



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discipline, responsibility, and social skills (Chairilisyah, 2019; Paramita, 2025).

Various research findings indicate that the independence skills of early childhood learners in Indonesia still require strengthening, particularly in aspects such as decision-making, responsibility, and learning initiative. Independence is one of the essential competencies that needs to be developed from an early age because it contributes to children's learning readiness, problem-solving abilities, and self-regulation in subsequent levels of education (Chairilisyah, 2019). In this study, the term Deep Learning refers to a pedagogical approach, namely learning that is meaningful, mindful, and enjoyable (Nurazizah et al., 2025). This approach emphasizes the active involvement of learners in the processes of exploration, reflection, and knowledge construction, resulting in deeper and more sustainable understanding.

The concept of implementing the Deep Learning model can support students' deeper understanding, knowledge integration, and application in real-life situations, while also fostering a lifelong learning mindset (Diputera et al., 2024). The implementation of the Deep Learning approach in Project-Based Learning (PjBL) is considered one of the effective alternatives. This approach emphasizes deep understanding, active engagement, and critical thinking skills. The application of the Deep Learning approach in project-based learning can enhance the independence of early childhood learners, where children are able to become more actively involved in their own learning processes (Sando et al., 2023). This approach not only encourages children to learn independently, but also invites them to actively participate and collaborate in completing projects that require the development of critical and creative skills (Yuliantina, 2023). Seven main themes in deep learning management, including planning, implementation, evaluation, characteristics and importance of learning independence, supporting factors, and challenges (Purwanti et al., 2025).

The PjBL model aims to facilitate children in developing critical thinking skills, collaboration, communication, and creativity through in-depth investigation of problems encountered in daily life (Martín et al., 2021; Soeprijanto et al., 2022). The PjBL model is designed to create enjoyable learning experiences, where children are given the opportunity to explore themes that interest them (Elina et al., 2023). Therefore, it must be adjusted to the characteristics of each child so that the activities carried out become more enjoyable and interesting for children. Project-Based Learning (PjBL) in early childhood education places children as the center of learning, actively engaging them to explore, investigate, and create tangible projects based on their interests (N. P. V. Indrawati, 2023). This approach is highly effective in building children's independence, as they are trained to make choices, solve problems, and take responsibility for their own projects. Through this self-directed and contextual stimulation, early childhood creativity encompassing fluency, flexibility, originality, and elaboration can be optimally developed.

From the perspective of teachers' understanding of the implementation of new learning methods and current technological mastery, as well as creativity in preparing projects, these aspects still need to be further explored. Previous studies have shown that many teachers do not yet fully understand how to effectively integrate technology and projects into the curriculum (Sari, 2018). Various previous studies have demonstrated that Project-Based Learning (PjBL) has a positive impact on early childhood development, particularly in improving critical thinking skills, creativity, social skills, and children's engagement in the learning process. However, studies that specifically examine how the principles of Deep Learning—namely meaningful learning, mindful learning, and joyful learning—are integrated into Project-Based Learning in early childhood education are still very limited. In fact, the characteristics of PjBL, which emphasize exploration, reflection, collaboration, and problem-solving, are closely related to the principles of Deep Learning that currently align with the direction of national education policy.

In addition, previous studies have generally employed quantitative approaches to measure the influence of PjBL on children's independence, thus providing limited insights into how teachers implement Deep Learning in project activities, the challenges encountered during implementation, and

the strategies used to develop children's independence contextually. As a result, understanding of the implementation process of Deep Learning in PjBL within early childhood education remains insufficiently comprehensive. This study not only identifies the level of children's independence, but also explores the challenges faced by teachers and the strategies applied in integrating the principles of Deep Learning into project activities. Therefore, the novelty of this study lies in: (1) the integration of the Deep Learning concept with Project-Based Learning; and (2) the identification of contextual strategies used by teachers to develop children's independence through the implementation of project-based Deep Learning.

Through contextual project activities, children are able to learn to explore, make decisions, and take responsibility for their own learning processes. Nevertheless, there are still gaps in its implementation, particularly regarding teacher readiness and classroom practices. This study examines how Deep Learning is implemented in Project-Based Learning, including the challenges encountered and the strategies used in implementing Deep Learning within Project-Based Learning.

2. METHODS

This study employed a qualitative research design aimed at gaining an in-depth understanding of the implementation of the Deep Learning approach in Project-Based Learning and its relation to early childhood independence. The study was conducted in Early Childhood Education (PAUD) institutions in Buleleng District, Bali. It involved three kindergartens, with two teachers from each school, totaling six teachers, as well as 20 children from TK Eka Dharma who were observed. The selection of these kindergartens considered the diversity of social and cultural backgrounds, as well as differences in the level of readiness for implementing Project-Based Learning in each school.

The primary data collection technique used was in-depth interviews conducted face-to-face with teachers as key informants. Data were collected through observation, in-depth interviews, and documentation. The observation instrument was used to measure the level of children's independence, which includes the following aspects: 1) learning initiative; 2) responsibility; 3) decision-making; 4) discipline and time management; and 5) perseverance.

Data were analyzed using qualitative data analysis techniques through the stages of data reduction, data display, and conclusion drawing. The collected data were analyzed using thematic analysis by examining the main themes emerging from interviews and field notes. The analysis process was carried out through several stages, namely data reduction, data presentation, and systematic conclusion drawing. To ensure data validity, this study applied source and method triangulation, conducted member checking with informants, and engaged in peer debriefing.

The findings of this study are expected to provide an empirical overview of the various challenges faced by teachers and schools in enhancing children's independence, as well as to identify strategies that have been or can be implemented to address these challenges effectively and in accordance with the educational context.

3. FINDINGS AND DISCUSSIONS

Results

The following presents the results of the observational analysis of the implementation of deep learning in Project-Based Learning (PjBL) on children's independence, which was conducted based on the following indicators: 1) learning initiative; 2) responsibility; 3) decision-making; 4) discipline and time management; and 5) perseverance.

Deep Learning towards Learning Initiatives

In the indicator of learning initiative, children appeared enthusiastic from the beginning of the activity. They independently took the tools and materials needed, such as cups, spoons, milk, sugar, salt, and ice cubes, without always being directed by the teacher. Previously, the children had been given guidance, enabling them to carry out the project stages based on the instructions provided. During the teacher's explanation, several children asked questions such as, "Why does the ice need to be rotated?" and "Why do we use salt?" The children also actively tried mixing the ingredients and began the process of rotating the ice cream mixture independently before receiving assistance from the teacher. In the middle of the activity, some children started giving ideas about the flavors or toppings they wanted to use for their ice cream. At the end of the project, when the ice cream was finished, one child took the initiative to share their homemade ice cream with the observer.



Figure 1. Demonstrates learning initiative

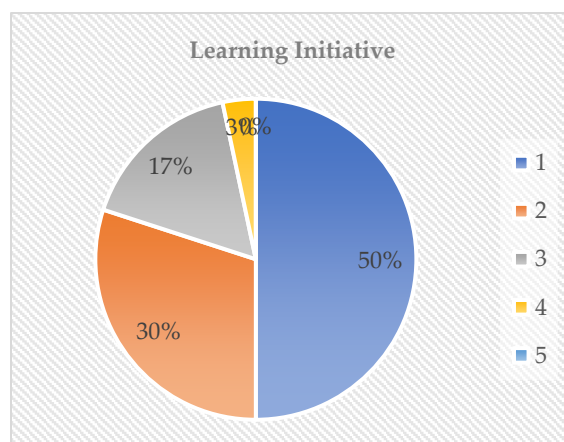


Figure 2. Percentage of Learning Initiative

Based on the learning initiative diagram (figure 2), the results show that the majority of children are in the very high learning initiative category. Fifty percent of children are at level 5, and 30% at level 4, for a total of 80% of children demonstrating high learning initiative. Meanwhile, 17% of children are at the medium level (level 3), only 3% at the low level (level 2), and there are no children at the very low level (level 1).

Deep Learning on Responsiveness

Based on the responsibility diagram, the results showed that the majority of children were in the very high responsibility category. Fifty percent of children were at level 5, and 27% at level 4, for a total of 80% of children demonstrating high responsibility. Meanwhile, 20% of children were at the medium level (level 3), only 3% at the low level (level 2), and there were no children at the very low level (level 1).

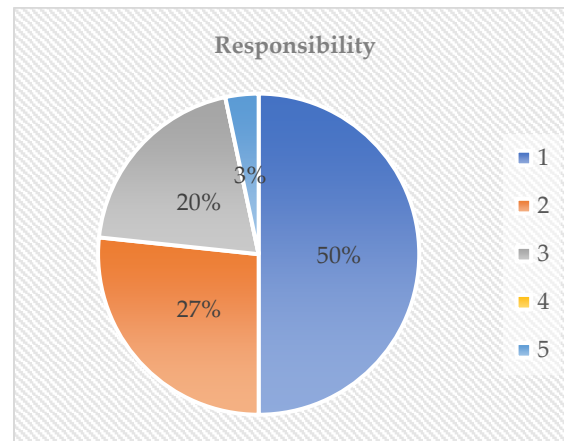


Figure 3. Percentage of Responsibility

In the indicator of responsibility, children were able to carry out the tasks assigned during the project activities. They helped prepare the materials, carefully poured the milk mixture, and cleaned the tools that had been used after the activity was completed. In group activities, the children also began to demonstrate cooperation and responsibility for their respective tasks, such as holding the ice cream container, pouring the salt, or helping friends during the process of rotating the ice cream mixture.



Figure 4. Demonstrates Responsiveness

Deep Learning for Decision Making

In the indicator of decision-making, children began to demonstrate the ability to make simple choices related to the project activities. They selected the ice cream flavors they wanted, decided on the toppings to use, and chose the tools they preferred during the ice cream-making process. Some children also started determining how to rotate the ice cream container so that the mixture would freeze more quickly. Out of the three groups, two groups successfully made ice cream, while one group was still unsuccessful, as the mixture remained in liquid form. The group that had not yet succeeded continued trying to rotate the container more vigorously. Some children from the other groups also helped the unsuccessful group by encouraging them, and several children were heard saying, “We need to add more ice,” “Rotate it faster,” and even, “Let’s add more salt.”



Figure 5. Demonstrates Decision-making

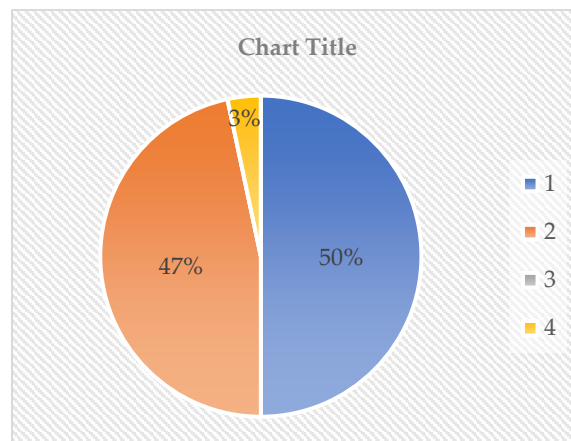


Figure 6. Percentage of Decision-making

Based on the decision-making diagram, the results show that the majority of children are in the very high decision-making category. Fifty percent of children are at level 5, and 47% at level 4, for a total of 97% of children demonstrating high decision-making. Meanwhile, 3% of children are at the low level (level 2), while there are no children at the medium level (level 3) or very low level (level 1).

Deep Learning on Discipline and Time Management

Furthermore, in the indicator of discipline and time management, children were observed following the stages of the project activities in an orderly manner. They were able to follow the sequence of activities, starting from preparing the materials, mixing the ingredients, adding ice and salt, to rotating the ice cream container according to the instructions. The children also began to understand that the process of making ice cream required time and needed to be carried out step by step in order to achieve successful results. In addition, the children took turns rotating the container and encouraged one another throughout the activity.



Figure 7. Demonstrates Discipline and Time Management

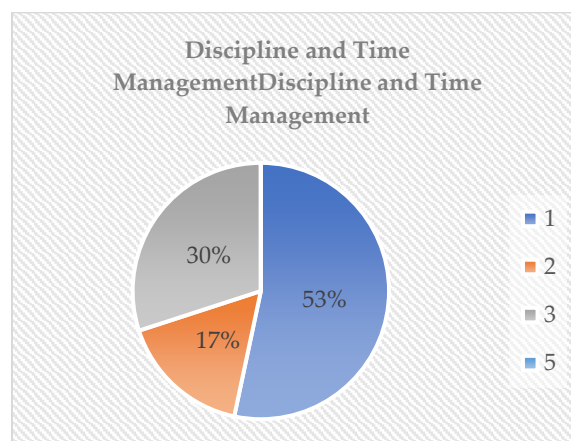


Figure 8. Percentage of Discipline and Time Management

Based on the discipline and time management diagram, the results show that most children are in the very high discipline and time management category. Fifty-three percent of children are at level 5, and 17% at level 4, for a total of 70% of children demonstrating high discipline and time management. Meanwhile, 30% of children are at the moderate level (level 3), while no children are at the moderate level (level 3) or very low level (level 1).

Deep Learning on Perseverance

Meanwhile, in the indicator of perseverance, children demonstrated efforts to continue completing the activity despite experiencing difficulties during the ice cream-making process. When the ice cream had not yet frozen and the container was difficult to rotate, the children continued trying again with simple assistance from the teacher. Several children were observed taking turns rotating the ice cream container with their friends until the ice cream was successfully formed. The children also remained actively involved until the activity was completed, including cleaning the area and the tools used.



Figure 9. Demonstrates Perseverance

Based on the persistence diagram, the results show that most children are in the very high persistence category. As many as 80% of children are at level 5, and 3% at level 4, so that a total of 83% of children show high persistence. Meanwhile, 14% of children are at the medium level (level 3), Meanwhile, 14% of children are at the medium level (level 3) and 3% at the very low level (level 1), and there are no children at the low level (level 2).

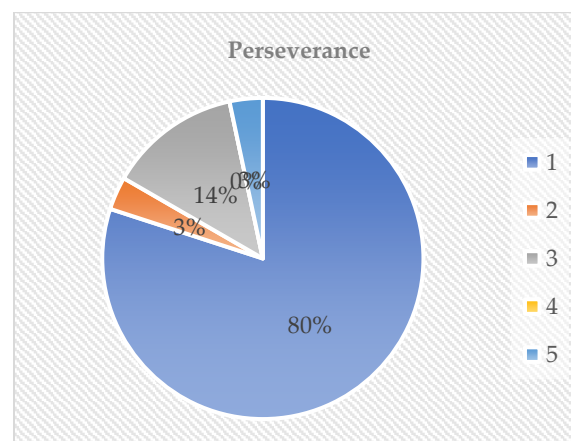


Figure 10. Percentage of Perseverance

Challenges in Implementing Deep Learning in Project-Based Learning for Children's Independence

In general, these challenges are related to teacher readiness, limited learning facilities, parental involvement, and the developmental characteristics of early childhood, who still require intensive guidance and support.

Table 1. Challenges in Implementing Deep Learning in Project-Based Learning

Yes	Informant Code	School	Main Findings
1	A	TK Eka Dharma	The teacher experiences difficulties in designing PjBL activities that can consistently promote Deep Learning processes in early childhood learners.
2	B	TK Eka Dharma	Teachers' understanding of Deep Learning implementation varies, resulting in less optimal learning practices.
3	C	TK Lab Undiksha Singaraja	Limited learning time becomes an obstacle in implementing in-depth and sustainable project activities.
4	D	TK Lab Undiksha Singaraja	Parental involvement in supporting children's project activities is still uneven, particularly in follow-up activities at home.
5	E	TK Kumara Dharma Kubutambahan	The lack of contextual learning media and resources poses a challenge in developing children's learning initiative through PjBL.
6	F	TK Kumara Dharma Kubutambahan	Some children still require intensive guidance to confidently ask questions, express ideas, and take initiative in project activities.

Source: Interview results

Based on Table 1, it can be seen that teachers still experience difficulties in designing project activities that are able to consistently promote the deep learning process in early childhood education. This is due to the varied understanding among teachers regarding the concept of Deep Learning and the implementation of PjBL in early childhood education. Some teachers still focus project activities on the final product, so the processes of exploration, reflection, and the development of children's curiosity have not been fully optimized.

In addition, limited instructional time is one of the main obstacles in the implementation of sustainable project activities. Project activities require a longer duration so that children can explore ideas, try various learning experiences, and build independent learning initiatives. However, the dense school schedule often prevents project implementation from being carried out optimally.

Strategies for Implementing Deep Learning in Project-Based Learning (PjBL) to Develop Children's Independence

The strategies for implementing deep learning in Project-Based Learning (PjBL) to develop children's independence are carried out contextually in accordance with school conditions, children's characteristics, and the socio-cultural environment of the Buleleng community. The following presents the results of interviews related to this matter.

Table 2. Strategies for Implementing Deep Learning in Project-Based Learning (PjBL) to Develop Children's Independence

Yes	Informant Code	School	Main Findings
1	A	TK Eka Dharma	The teacher implements projects based on daily activities so that children become accustomed to making decisions and completing tasks independently.
2	B	TK Eka Dharma	The use of open-ended questions and simple reflection helps children become more confident in expressing their ideas during project activities.
3	C	TK Lab Undiksha	The utilization of the surrounding environment as a learning resource

Yes	Informant Code	School	Main Findings
		Singaraja	increases children's active involvement and independence in exploring projects.
4	D	TK Lab Undiksha Singaraja	Regular collaboration between teachers and parents is conducted to build consistency in children's independent habits both at home and at school.
5	E	TK Kumara Dharma Kubutambahan	Teachers utilize natural materials and simple media in the village environment to support contextual and independent project activities.
6	F	TK Kumara Dharma Kubutambahan	Gradual scaffolding is applied to encourage children to try, ask questions, and complete project activities independently.

Source: Interview results

One of the main strategies implemented is the use of project-based activities rooted in children's daily life experiences. Teachers design activities that are close to children's experiences, such as caring for plants, preparing their own dining utensils, and simple environment-based projects. This approach helps children learn to make decisions, take responsibility for tasks, and build self-confidence in completing activities independently.

In addition, teachers also apply open-ended questions and simple reflection activities during the learning process. This strategy is intended to encourage children to think more actively, express their opinions, and share ideas throughout the project. Through this process, children not only become more active in learning but also begin to show confidence in taking independent initiative.

Discussion

Previous studies have generally discussed Project-Based Learning (PjBL) as an approach that influences creativity, social skills, or thinking abilities in early childhood learners. Meanwhile, studies on children's independence have mostly emphasized habituation and active learning strategies in general. Research integrating Deep Learning with PjBL in the context of early childhood education is still very limited, especially studies that examine how the learning process shapes children's independence through meaningful learning experiences. This study not only examines the final outcomes of the project or the level of children's independence, but also explains the process by which project-based learning experiences gradually shape children's independent behavior (Suci & Fathiyah, 2023).

Regarding deep learning and learning initiative, This indicates that the deep learning approach in PjBL is able to stimulate children's curiosity and internal motivation to learn actively (Fitriani et al., 2026). Contextual and meaningful projects provide opportunities for children to choose topics that interest them, so they no longer depend on teacher instructions. This finding is in line with the concept of student-centered learning, where deep learning instills a lifelong learning mindset from an early age (Qadafi, 2023).

In the indicator of responsibility, through structured yet flexible projects, children learned to complete tasks that were part of their projects. For example, when children were involved in planning, implementing, and completing projects with their peers, they naturally learned to take responsibility for their roles and tasks. This finding strengthens the idea that play and objects in Deep Learning can facilitate the development of responsibility through active engagement (Amanda & Wahyuningsih, 2025; Hasanah & Purnama, 2024; Wulandari et al., 2025)

The indicator of decision-making suggests that the Deep Learning approach in Project-Based Learning (PjBL) is highly effective in training children to make meaningful choices throughout the project process (Diputera et al., 2024). Children are encouraged to determine the direction of exploration, select tools or materials, and solve problems that arise (Permatasari et al., 2025). This ability constitutes an early foundation of personal autonomy, which is highly relevant to early childhood developmental tasks.

The indicators of discipline and time management are relatively abstract skills that require cognitive maturity and repeated experiences (Syawa et al., 2025). Early childhood learners are still in a transitional phase in understanding the concept of time (for example, today, tomorrow, and later). Therefore, teachers need to provide additional support such as project schedule visualizations, regular reminders, and consistent routines to strengthen aspects of discipline and time management.

The indicator of perseverance is closely related to grit or persistence in facing challenges (Tualeka & Bashori, 2023). In the context of Project-Based Learning (PjBL), children are often faced with problems that are not simple, such as trying different ways to prevent a block tower from collapsing or mixing the right colors (Hibana et al., 2024). The trial-and-error process that occurs within a supportive environment, where the teacher acts as a facilitator rather than an instant problem solver, encourages children not to give up easily. These findings explain that PjBL develops critical and creative skills through meaningful challenges (Afriani et al., 2025).

Conceptually, this relationship can be explained through the following mechanism: in deep learning, children do not merely memorize or imitate, but rather construct understanding through direct experience, reflection, and connections between concepts (Rahmat et al., 2025). When this process is embedded within PjBL, children have greater control over their learning, starting from planning, implementation, to project evaluation (Paramita et al., 2025; Putri et al., 2022). This control and autonomy become the main catalysts for the development of independence. This is in line with Vygotsky's constructivist theory, where children learn through social interaction and appropriate scaffolding, which is then internalized into self-regulation (Muzakki et al., 2021).

Deep Learning through Project-Based Learning (PjBL) fosters children's independence through three main processes: exploration, elaboration, and reflection. In the exploration stage, children are given opportunities to interact directly with tools, materials, and real-life situations within project activities. This process stimulates curiosity, the courage to try, and children's learning initiative. During the elaboration stage, children begin to build connections between the experiences they gain and their prior knowledge through activities such as asking questions, engaging in discussions, trying different approaches, and making simple decisions throughout the project process. Furthermore, in the reflection stage, children begin to understand the meaning of their experiences, such as the importance of completing tasks, cooperating with others, being responsible, and maintaining discipline in learning activities (Nurazizah et al., 2025; Nurhamidah & Nurachadijat, 2023). Through these processes, children's independence develops naturally because they are given space to learn through direct experiences rather than merely receiving instructions from the teacher. Children begin to demonstrate independent behaviors such as choosing tools independently, initiating activities without waiting for directions, asking questions, completing tasks until the end, and continuing to try when experiencing difficulties during project activities.

Project-based learning that provides children with opportunities to explore real experiences, ask questions, make decisions, engage in simple reflection, and complete tasks gradually is able to encourage the emergence of learning initiative, responsibility, discipline, and perseverance. The processes of exploration and reflection in Deep Learning enable children not only to receive information passively, but also to construct understanding through direct experiences, allowing independent behavior to develop in a more meaningful and sustainable way.

Regarding the challenges encountered, parental involvement in supporting project activities needs

to be more evenly distributed. Some parents have been actively involved in accompanying their children in continuing project activities at home, while others still do not fully understand the importance of stimulating learning initiatives through project-based activities (Rochanah, 2025). This condition results in the continuity of children's learning experiences between home and school not being optimally achieved.

On the other hand, the limited availability of contextual learning media and resources in several kindergartens in Buleleng Regency also poses a challenge in implementing Deep Learning-based PjBL. Teachers need to be more creative in utilizing the surrounding environment as a learning resource so that children can still gain meaningful learning experiences even when school facilities are limited (Aslindah, 2020; Dewi, 2021). Children still require intensive guidance to feel confident in asking questions, expressing ideas, and taking initiative during project activities. The development of learning initiatives in early childhood requires a gradual and consistent process, supported by a safe and responsive learning environment that meets children's needs.

The utilization of the surrounding environment as a learning resource is another important strategy, especially in schools with limited learning facilities. Teachers make use of natural materials, the village environment, and Buleleng's local culture as contextual project media that are easily understood by children (Dewi, 2021; Saptutyningsih & Kamiel, 2019; Utomo et al., 2024). In this way, learning activities can still take place meaningfully without relying on expensive media or complex technology.

In addition, collaboration between teachers and parents is also an essential component in supporting the development of children's independence (Ashanty & Imamah, 2024; Hidayanti et al., 2023). Teachers regularly communicate with parents regarding project activities that can be continued at home (Rochanah, 2025). This strategy helps create continuity in independence stimulation between the school and family environments, enabling children to gain more consistent learning experiences.

Teachers also implement gradual scaffolding to support children who still require assistance in participating in project activities. This support is provided step by step by giving examples, simple guidance, and motivation so that children are encouraged to try, ask questions, and complete tasks independently (Nabilah & Silmi, 2024; Nurhidayati et al., 2026). As the learning process progresses, teacher assistance is gradually reduced so that children can demonstrate more optimal independent abilities.

The findings of this study provide important implications for early childhood education (ECE) educators. First, teachers need to continuously develop their role as facilitators who provide probing questions to stimulate reflection and metacognition, rather than acting as the sole source of answers. Second, project design should consider the stages of deep learning, namely: exploration (stimulating curiosity), elaboration (building connections between concepts), and reflection (deriving meaning from experiences). Third, the assessment of children's independence should be conducted continuously through observation in various project contexts, rather than relying solely on tests or worksheets.

This study still has limitations, particularly the restricted scope of the research, which only covers three kindergartens. Therefore, future research is recommended to conduct more in-depth instrument testing and to expand the geographical scope of the study. In addition, subsequent studies may develop experimental designs to more comprehensively examine the effectiveness of the deep learning approach, as well as explore other variables such as teacher readiness, parental support, and the use of technology in learning.

4. CONCLUSION

The implementation of Deep Learning in Project-Based Learning (PjBL) provides positive implications for the development of independence in early childhood learners. The findings of this study indicate that children were able to demonstrate independent behavior across various indicators, including learning initiative, responsibility, decision-making, discipline and time management, as well as perseverance during project activities. Through contextual project activities, such as an ice cream-making project, children were actively involved in exploring materials, asking questions, making simple decisions, completing tasks collaboratively within groups, and continuing to make efforts when facing difficulties. These experiences helped children develop independence naturally through meaningful and direct experiential learning processes.

Conceptually, Deep Learning in PjBL fosters children's independence through three main stages: exploration, elaboration, and reflection. During the exploration stage, children are given opportunities to interact directly with tools, materials, and real-life situations, thereby stimulating curiosity and learning initiative. In the elaboration stage, children begin to connect new experiences with prior knowledge through activities such as asking questions, engaging in discussions, trying different approaches, and making simple decisions throughout the project activities. Furthermore, in the reflection stage, children begin to understand the meaning of their learning experiences, such as the importance of responsibility, discipline, cooperation, and perseverance in completing tasks. These processes encourage children to become more active in constructing their own understanding, allowing independent behavior to develop in a more meaningful and sustainable manner.

This study also reveals that the implementation of Deep Learning in PjBL still faces several challenges, including differences in teachers' understanding of the Deep Learning concept, limited instructional time, lack of contextual learning media and resources, uneven parental involvement, and the characteristics of early childhood learners who still require intensive guidance. To address these challenges, teachers implemented various contextual strategies, such as the use of projects based on daily activities, the provision of open-ended questions and simple reflections, the utilization of the surrounding environment as a learning resource, collaboration with parents, and the gradual application of scaffolding according to children's developmental needs.

The findings of this study provide important implications for early childhood education practices. Teachers need to strengthen their role as facilitators who are capable of creating learning experiences that are meaningful, mindful, and enjoyable through contextual project activities. In addition, project design should place greater emphasis on the processes of exploration, reflection, and children's learning experiences, rather than focusing solely on the final outcomes of the project. Assessment of children's independence should also be conducted continuously through authentic observation throughout the project activities.

This study contributes new insights to the field of early childhood education, particularly regarding the integration of Deep Learning into Project-Based Learning to foster children's independence. The novelty of this study lies in its attempt to explain the conceptual mechanism through which Deep Learning in PjBL shapes children's independent behavior through contextual, active, and reflective learning experiences.

Nevertheless, this study still has limitations, as it was conducted only in three kindergartens in Buleleng Regency, meaning that the findings cannot yet be generalized broadly. Therefore, future studies are recommended to expand the research coverage area, conduct more in-depth instrument validation, and develop experimental or mixed-methods research designs to examine the effectiveness of Deep Learning in PjBL more comprehensively. Future research may also explore other factors influencing successful implementation, such as teacher readiness, parental support, learning environments, and the use of technology in project-based learning within early childhood education.

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