

## Research Article

# Examining the Integration of Deep Learning in the Implementation of the Independent Curriculum in Early Childhood Education: A Systematic Literature Review

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**Abstract:** *The implementation of the Independent Curriculum encourages a transformation of learning that is student-centered, meaningful, and oriented towards holistic competency development. In line with this direction, Deep Learning is an approach that emphasizes meaningful, mindful, and joyful learning to support optimal child development. This study aims to identify, evaluate, and synthesize literature on the integration of Deep Learning in the implementation of the Independent Curriculum in Early Childhood Education (PAUD). The study used a Systematic Literature Review (SLR) approach with the PRISMA 2020 protocol and the PICOS framework. Literature was obtained from Scopus, Web of Science, ERIC, ScienceDirect, SpringerLink, Taylor & Francis, Sage Journals, and Google Scholar for the period 2020–2026. Based on the selection process, 50 articles met the inclusion criteria and were analyzed using thematic synthesis. The results of the study indicate that the integration of Deep Learning in PAUD is realized through meaningful learning, learning through play, holistic development of children's competencies, and strengthening the role of teachers as learning facilitators. This study also demonstrates the philosophical alignment between Deep Learning and the Independent Curriculum in creating authentic, child-centered learning. This research identifies theoretical, methodological, and contextual gaps that can inform further research.*

**Keywords:** *Deep Learning, Independent Curriculum, Early Childhood Education, Meaningful Learning, Learning Through Play*

## 1. Introduction

The transformation of 21st-century education has driven fundamental changes in how we view the learning process. Education is no longer solely oriented toward mastering factual knowledge, but is also directed toward developing critical thinking, creativity, collaboration, communication, and complex problem-solving skills in a variety of real-life situations (OECD, 2023). The development of digital technology, artificial intelligence, globalization, and changing student characteristics require education systems to produce individuals capable of lifelong learning and adapting to rapid change. These conditions have made the quality of the learning process an increasingly important issue, as educational success is determined not only by the quantity of material taught but also by students' ability to understand, construct, and apply knowledge meaningfully in everyday life (Darling-Hammond et al., 2020).

Various international reports indicate that many education systems still face challenges in realizing truly deep learning. Learning practices in various countries are often dominated by memorizing information, mechanically completing assignments, and achieving short-term academic targets, which leave little room for students to develop strong conceptual understanding and reflective thinking skills (Fullan et al., 2024). As a result, students are able to retain information in the short term but struggle to connect that knowledge to real-life contexts or use it to solve more complex problems.

This phenomenon demonstrates a gap between learning oriented toward mastery of material and learning that produces in-depth understanding and competencies relevant to future needs.

These challenges also apply to early childhood education, which serves as a crucial foundation for lifelong individual development. Numerous studies have shown that early childhood learning experiences significantly influence children's cognitive, social, emotional, linguistic, moral, and character development at subsequent levels of education (UNESCO, 2024). Early childhood education should provide a space for children to explore their environment, foster curiosity, develop creativity, interact with peers, and construct understanding through meaningful experiences. However, numerous studies indicate that learning practices in some PAUD units still face a tendency toward early academicization (schoolification of early childhood education), a learning orientation that overemphasizes formal reading, writing, and arithmetic skills before children reach the appropriate developmental stage (Zosh et al., 2022). This situation has the potential to reduce children's opportunities to develop critical thinking skills, creativity, social-emotional skills, and curiosity, which are crucial foundations for lifelong learning.

The development of education in Indonesia presents similar challenges. The results of various educational evaluations indicate that the learning process still faces challenges such as the dominance of teacher-centered learning methods, limited student exploration in the learning process, and suboptimal learning that builds in-depth conceptual understanding. In the context of early childhood education, these challenges are exacerbated by differences in service quality across educational units, variations in teacher competency, and differences in institutional readiness to implement various evolving educational policies. This situation has prompted the Indonesian government to transform education through the implementation of the Independent Curriculum, designed to create more flexible, contextual, student-centered learning that is relevant to 21st-century needs (Kemendikbudristek, 2022).

The Independent Curriculum places students as the primary subjects in the learning process. This curriculum provides educators with greater freedom to design learning experiences tailored to their characteristics, needs, interests, and potential. In early childhood education (PAUD) units, the implementation of the Independent Curriculum emphasizes the importance of learning oriented toward holistic child development through meaningful play activities, environmental exploration, social interactions, and character building aligned with the Pancasila Student Profile. This approach demonstrates a paradigm shift from learning solely focused on academic outcomes to one focused on processes and meaningful learning experiences.

In line with this direction of educational transformation, the concept of Deep Learning is gaining increasing attention in various global and national educational discourses. Deep Learning in the educational context differs from the concept of Deep Learning in the field of artificial intelligence. Deep Learning in education refers to a learning process that enables students to build in-depth understanding, connect knowledge with real-life experiences, reflect on the learning process, and apply knowledge in various life contexts (Fullan et al., 2018). This approach emphasizes active student involvement in the learning process so that learning does not stop at the level of memorizing information, but develops into the ability to understand, analyze, evaluate, and create new knowledge.

In the development of Indonesian education policy, Deep Learning is beginning to be seen as an approach capable of strengthening the implementation of the Independent Curriculum. The concept

of mindful, meaningful, and joyful learning, which is a key characteristic of Deep Learning, strongly aligns with the philosophy of the Independent Curriculum, which emphasizes learner-centered learning, learning differentiation, and holistic competency development. In the context of Early Childhood Education (PAUD), the integration of Deep Learning becomes increasingly relevant because the characteristics of early childhood demand a learning process that provides opportunities for exploration, questioning, experimenting, interacting, and constructing meaning through direct experience. Learning that provides meaningful experiences is believed to help children develop thinking skills, curiosity, creativity, and social skills more optimally than learning that focuses on memorization and information reproduction (Darling-Hammond et al., 2020; Zosh et al., 2022).

Although the concepts of Deep Learning and the Independent Curriculum have both received significant attention in recent years, research in both fields still shows various limitations. Most research on the Independent Curriculum focuses on curriculum implementation, differentiated learning, assessment, the Pancasila Student Profile Strengthening Project, and teacher readiness to implement the new policy. Research on Deep Learning is also developing at various levels of education, particularly elementary, secondary, and higher education. Studies specifically linking Deep Learning to the implementation of the Independent Curriculum in Early Childhood Education are still relatively limited and scattered across different research contexts.

These limitations indicate a fragmented literature, resulting in a lack of comprehensive understanding of the integration of Deep Learning into the implementation of the Independent Curriculum in Early Childhood Education (ECE). Some studies discuss Deep Learning as a stand-alone pedagogical approach, while others discuss the Independent Curriculum without linking it to deep learning principles. This situation leaves the conceptual relationship between Deep Learning, meaningful learning, play-based learning, differentiated learning, and the philosophy of the Independent Curriculum incompletely explained in the available literature.

From a methodological perspective, most previous research has utilized case studies, descriptive qualitative research, surveys, and reports on best practices in learning implementation. Studies using a Systematic Literature Review (SLR) approach to map the development of research on the integration of Deep Learning into the implementation of the Independent Curriculum in Early Childhood Education (ECED) are still very limited. Consequently, there is no available body of knowledge that can systematically and evidence-basedly describe research trends, key findings, theoretical debates, methodological approaches, and future research directions.

Another gap is evident in the research context, which is still dominated by elementary and secondary education. The developmental characteristics of early childhood differ from those of students at other levels, making research findings in elementary and secondary education difficult to directly generalize to the early childhood education context. This situation highlights the need for studies that specifically map how Deep Learning is understood, implemented, and developed in early childhood learning based on the Independent Curriculum.

Based on these various phenomena and research gaps, a study is needed that can systematically integrate various research findings to provide a more comprehensive picture of the development of research on the integration of Deep Learning in the implementation of the Independent Curriculum in Early Childhood Education. This research was conducted using a Systematic Literature Review (SLR) approach with the PRISMA 2020 protocol to identify, evaluate, and synthesize various relevant studies. This study aims to map research trends, identify key emerging themes, analyze methodological approaches used, identify remaining research gaps, and formulate a future research agenda related to the integration of Deep Learning in the implementation of the Independent

Curriculum in Early Childhood Education. The research results are expected to provide theoretical contributions to the development of Deep Learning and the Independent Curriculum studies, while also providing practical implications for teachers, PAUD unit managers, curriculum developers, and policymakers in realizing more meaningful, reflective, and developmentally appropriate learning in the era of educational transformation.

## **2. Literature Review**

### **Deep Learning Theory**

Deep Learning, in the context of education, is a learning approach oriented toward developing in-depth conceptual understanding, reflective skills, knowledge transfer, and the ability to apply knowledge in various real-life situations. This approach developed as a critique of learning that is solely oriented toward memorization, information reproduction, and short-term academic achievement. Deep Learning positions students as active subjects who construct meaning through authentic learning experiences, social interactions, reflection, and problem-solving (Fullan et al., 2024; Andayanie et al., 2025; Feriyanto & Anjariyah, 2024). This approach is considered capable of meeting the needs of 21st-century education, which demands critical thinking skills, creativity, collaboration, communication, and the ability to adapt to rapid change.

Literature shows that Deep Learning is fundamentally different from surface learning. Surface learning focuses on superficial mastery of information, memorizing facts, and completing tasks without understanding the underlying meaning. In contrast, Deep Learning encourages students to understand the relationships between concepts, develop critical reasoning, reflect on learning experiences, and construct new knowledge based on their experiences (Maulidya, 2025; Ramadhan, 2025; Ulfa, 2026). These differences make Deep Learning increasingly relevant in modern education systems, which no longer position students as passive recipients of information but as active learners capable of independently generating knowledge.

The development of the Deep Learning concept in recent years indicates a shift in the learning paradigm from merely achieving learning outcomes to strengthening the quality of the learning process. Fullan and colleagues explain that deep learning is oriented towards developing global competencies through authentic and meaningful learning experiences. From this perspective, learning success is measured not only by students' ability to answer questions or complete assignments, but also by their ability to fully understand concepts, apply knowledge in new contexts, and generate creative solutions to various problems encountered (Fullan et al., 2024). This approach is gaining increasing attention in various studies because it is considered capable of increasing student engagement and the quality of learning outcomes in a sustainable manner.

Recent studies show that Deep Learning is built on three main pillars: meaningful learning, mindful learning, and joyful learning. These three components complement each other in creating a holistic and sustainable learning experience. Meaningful learning emphasizes the importance of connecting new knowledge with students' existing experiences and knowledge. Mindful learning emphasizes awareness, attention, and reflection throughout the learning process. Joyful learning focuses on creating a learning environment that is enjoyable and safe and can increase students' intrinsic motivation (Feriyanto & Anjariyah, 2024; Ramadhan, 2025; Andayanie et al., 2025). Research shows that the integration of these three components contributes to increased learning engagement, conceptual understanding, and the quality of students' learning experiences.

Meaningful learning is one of the main foundations of Deep Learning because it allows students to connect new information with their pre-existing knowledge structures. Meaningful learning encourages students to understand the relevance of the material being studied to everyday life, so that learning is not viewed as an activity separate from the realities of life. Several studies have shown that meaningful learning can improve knowledge retention, learning transfer, and deeper conceptual understanding compared to learning that is solely oriented towards memorization (Feriyanto & Anjariyah, 2024; Maulidya, 2025; Andayanie et al., 2025).

Mindful learning is another important component of Deep Learning because it relates to students' ability to learn consciously and reflectively. This approach encourages students to understand learning objectives, monitor their thinking processes, and evaluate their learning experiences. Mindful learning helps students develop metacognitive and self-regulation skills, which contribute to improving the quality of long-term learning (Diputera, 2024; Rosiyati, 2025; Ramadhan, 2025). Various studies have shown that students with high learning awareness tend to be more capable of understanding concepts deeply and retaining learning outcomes over a longer period of time.

Joyful learning complements the previous two components by creating enjoyable and motivating learning experiences. Joyful learning is not only related to a comfortable classroom atmosphere but also provides space for students to explore ideas, develop creativity, and actively participate in the learning process. A positive learning environment has been shown to increase student emotional engagement, making the learning process more effective and meaningful (Feriyanto & Anjariyah, 2024; Mawardi, 2025; Ramadhan, 2025). Therefore, joyful learning is seen as a crucial element in creating learner-centered learning and supporting holistic competency development.

In the context of Early Childhood Education (PAUD), Deep Learning has strong relevance due to the developmental characteristics of children who learn through direct experience, exploration, social interaction, and play activities. Research shows that deep learning in PAUD can be realized through activities that allow children to observe, ask questions, try, experiment, and reflect on the experiences gained during the learning process (Jayawardana, 2025; Jannah et al., 2026; Eriani, 2025). This approach helps children develop curiosity, creativity, critical thinking skills, and social-emotional skills, which are important foundations for their future development.

Recent research also shows that the implementation of Deep Learning in Early Childhood Education (PAUD) is increasingly developing through project-based play learning, experiential learning, and exploration-based learning approaches that enable children to build understanding through authentic, developmentally appropriate activities. This approach demonstrates that Deep Learning is not only relevant to primary and secondary education but also holds significant potential to support optimal early childhood development (Suryana, 2025; Aziz & Mulyono, 2026; Jannah et al., 2026).

### **Independent Curriculum Theory**

The Independent Curriculum is a national education policy designed to create more flexible, student-centered learning, and oriented toward competency development. This curriculum was born in response to the need for educational transformation that demands critical thinking skills, creativity, collaboration, communication, and strong character as preparation for facing the challenges of the 21st century. The main philosophy of the Independent Curriculum positions students as individuals with different needs, interests, potential, and characteristics, so the learning process needs to be designed adaptively and contextually (Rahayu et al., 2022; Mustapa, 2025; Latifah et al., 2026).

One of the main characteristics of the Independent Curriculum is the implementation of student-centered learning. This approach provides students with greater opportunity to actively participate

in the learning process, develop their potential, and build knowledge through meaningful learning experiences. Teachers no longer act as the sole source of information, but rather as facilitators, helping students develop independent and reflective learning skills (Rahayu et al., 2022; Sanjaya, 2025; Mustapa, 2025).

In Early Childhood Education units, the Independent Curriculum places holistic child development as the primary learning objective. This curriculum emphasizes not only cognitive aspects but also social, emotional, language, physical-motor, moral, and spiritual development. Learning is designed based on children's developmental stages and implemented through activities that enable children to gain authentic and meaningful learning experiences. This approach demonstrates a paradigm shift from an academic orientation to the development of more comprehensive foundational skills.

The Independent Curriculum also emphasizes the importance of differentiated learning as a strategy to accommodate student diversity. Differentiated learning allows teachers to tailor learning objectives, materials, strategies, and assessments to meet the needs and characteristics of students. In the context of early childhood education (PAUD), this approach is crucial because each child has a different developmental level, interests, and learning style. Various studies have shown that differentiated learning can increase student participation, engagement, and the overall quality of the learning experience (Mustapa, 2025; Sanjaya, 2025; Analysis of the Implementation of Project-Based Learning and Differentiated Learning, 2025).

Another prominent characteristic of the Independent Curriculum is learning through play. Play is seen as a primary means for children to learn, explore their environment, build social relationships, develop creativity, and construct knowledge naturally. Various studies have shown that purposefully designed play activities can support children's cognitive, language, social-emotional, and character development more effectively than overly formal learning approaches at an early age (Jayawardana, 2025; Jannah et al., 2026; Eriani, 2025).

Recent developments in education policy indicate that the implementation of the Independent Curriculum is being further strengthened through a Deep Learning approach. Numerous studies confirm that the principles of Deep Learning align strongly with the philosophy of the Independent Curriculum, as they both place students at the center of learning, emphasize meaningful learning experiences, and encourage holistic competency development (Latifah et al., 2026; Rosiyati, 2025; Izzuddin, 2026). This integration is seen as capable of strengthening the quality of learning through mindful, meaningful, and joyful learning experiences, thereby optimally achieving the objectives of the Independent Curriculum.

From a theoretical perspective, the relationship between Deep Learning and the Independent Curriculum demonstrates a strong philosophical alignment. Both emphasize the importance of learner-centered learning, authentic learning experiences, holistic competency development, and the development of lifelong learning skills. Therefore, the integration of Deep Learning into the implementation of the Independent Curriculum in Early Childhood Education is an important issue requiring further study because it has the potential to contribute to improving the quality of learning, strengthening children's competencies, and developing educational practices that are more relevant to future needs.

### 3. Method

This study uses a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize various studies related to the integration of Deep Learning in the implementation of the Independent Curriculum in Early Childhood Education (PAUD). The SLR approach was chosen because it is able to produce a systematic, transparent, replicable, and evidence-based literature synthesis, thus providing a more comprehensive understanding of the development of a research field (Snyder, 2019). This approach also allows researchers to map research trends, identify research gaps, evaluate conceptual developments, and formulate a future research agenda relevant to the development of early childhood education (Paul & Criado, 2020).

In this study, the process of identifying, selecting, and evaluating articles was conducted following the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency, objectivity, and quality of the literature review process (Page et al., 2021). The use of PRISMA allows each stage of article selection to be carried out systematically, thereby minimizing research bias. Furthermore, this study adopted the PICOS (Population, Intervention, Comparison, Outcome, Study Design) framework to help determine the research focus, literature search strategy, and article selection criteria used in the review process.

#### a. Identification Stages

The identification stage was conducted by searching for articles in various reputable international and national academic databases relevant to the fields of education, early childhood education, curriculum, and learning innovation. The databases used included Scopus, Web of Science (WoS), ERIC, ScienceDirect, SpringerLink, Taylor & Francis Online, Sage Journals, and Google Scholar. These databases were selected because they have a broad publication coverage and are widely used in educational research and systematic literature reviews. This study focuses on articles published between 2020 and 2026. This time period was chosen to ensure that the literature used represents the latest developments in Deep Learning, the Independent Curriculum, meaningful learning, and early childhood education.

The main keywords used in the article search process include:

- "Deep Learning" AND "Early Childhood Education"
- "Deep Learning" AND "Kindergarten"
- "Deep Learning" AND "Preschool Education"
- "Deep Learning" AND "Freedom Curriculum"
- "Deep Learning" AND "Curriculum Implementation"
- "Meaningful Learning" AND "Early Childhood"
- "Mindful Learning" AND "Early Childhood Education"
- "Joyful Learning" AND "Preschool"
- "Merdeka Curriculum" AND "Early Childhood Education"
- "Independent Curriculum" AND "PAUD"
- "Learning Through Play" AND "Deep Learning"
- "Child-Centered Learning" AND "Early Childhood Education"

Keyword combinations were performed using Boolean operators (AND and OR) to broaden the search scope while maintaining the relevance of the articles retrieved. This search strategy enabled researchers to comprehensively identify various studies discussing deep learning, meaningful learning, the Independent Curriculum, play-based learning, and early childhood education.

**b. Article Selection Stage**

The article selection process was conducted based on the PRISMA 2020 procedure, which consists of identification, screening, eligibility, and inclusion. During the identification stage, 247 articles were obtained from various academic databases. After reviewing and removing 82 duplicate articles, 165 articles remained for the screening process. During the screening stage, article titles and abstracts were evaluated to ensure they aligned with the research focus. Fifty-eight articles were eliminated because they did not directly address Deep Learning, the Independent Curriculum, or Early Childhood Education. After this process, 107 articles were selected for the retrieval stage. During the retrieval stage, 17 articles were found to be unavailable in full-text format and therefore could not be analyzed further. The remaining 90 articles then entered the eligibility stage for a comprehensive assessment through a full-text review.

The eligibility stage evaluated the suitability of the theory, methodology, research context, and relevance of the article's substance to the research focus. Twenty-one articles were eliminated because they lacked a conceptual basis relevant to Deep Learning or the Independent Curriculum. Another 19 articles were eliminated because their research focus was unrelated to Early Childhood Education or only discussed Deep Learning technology in Artificial Intelligence. Based on the overall selection process, 50 articles met the criteria for further analysis in this study.

**c. Eligibility Criteria****- Inclusion Criteria**

- 1) The article discusses Deep Learning in the context of education.
- 2) The article discusses the implementation of the Independent Curriculum or learning that is in line with the principles of the Independent Curriculum.
- 3) The article discusses Early Childhood Education (PAUD), Preschool Education, Early Childhood Education, or Kindergarten Education.
- 4) Articles are published in reputable international journals, accredited national journals, or indexed scientific proceedings.
- 5) Articles published in the period 2020–2026.
- 6) The article is available in full-text PDF format.
- 7) Articles use quantitative, qualitative, mixed methods, conceptual, and review approaches that are relevant to the research topic.

**- Exclusion Criteria**

- 1) The article discusses Deep Learning in the context of Artificial Intelligence, Machine Learning, or Computer Science.
- 2) The article has no relation to Early Childhood Education.
- 3) The article only discusses the Independent Curriculum without any connection to in-depth learning or meaningful learning.
- 4) The article is not available in full-text form.
- 5) Duplicate article.
- 6) Articles in the form of popular opinion, editorials, or non-academic documents that have not gone through a peer-review process.

**d. Inclusion Stage**

A total of 50 articles that met the inclusion criteria were then extracted and analyzed using the thematic synthesis approach as developed by Thomas and Harden (2008). The analysis was conducted by grouping the articles based on the main themes that emerged in the literature.

Article categorization was done using the PICOS framework which includes:

- Population: Early childhood, PAUD teachers, and Early Childhood Education units.
- Intervention: Implementation of Deep Learning, meaningful learning, mindful learning, joyful learning, and learning approaches that support the Independent Curriculum.
- Comparison: Comparison of traditional learning approaches with deep learning.
- Outcome: Improved quality of learning, child engagement, development of competencies, creativity, critical thinking skills, and holistic development of children.
- Study Design: Quantitative, qualitative, mixed methods research, case studies, action research, and literature review.

Each article is analyzed based on its research focus, theoretical foundation, methodological approach, implementation context, key findings, and implications for the development of Early Childhood Education (ECE) learning based on the Independent Curriculum. This analysis allows the research to produce a more comprehensive conceptual synthesis of the relationship between Deep Learning and the implementation of the Independent Curriculum in Early Childhood Education.

#### e. Presentation of Results with PRISMA Diagram

The article selection process is presented in the form of a 2020 PRISMA Diagram that illustrates the number of articles at each selection stage, starting from initial identification through academic databases, the title and abstract screening process, full-text eligibility assessment, to the final articles included in the Systematic Literature Review (SLR) analysis. The PRISMA Diagram is used to increase transparency, objectivity, and replicability of the review process so that every article selection decision can be methodologically accounted for. The diagram also helps visualize the article reduction process based on predetermined inclusion and exclusion criteria.

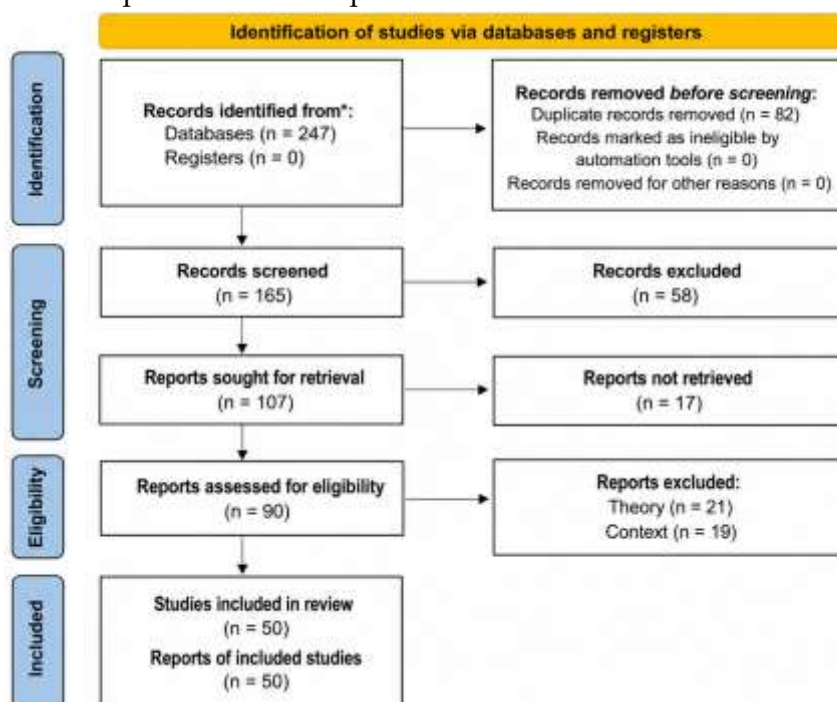


Figure 1. PRISMA diagram

Figure 1 demonstrates the systematic literature review (SLR) process to ensure that the articles analyzed are truly relevant to the integration of Deep Learning into the implementation of the Independent Curriculum in Early Childhood Education. Using the PRISMA 2020 approach, this study maps research developments, identifies key trends and themes, identifies remaining research gaps,

and formulates a future research agenda. With this approach, the research findings are expected to provide conceptual and practical contributions to the development of meaningful, reflective, and child-centered learning within the Independent Curriculum framework.

## 4. Results and Research Gap

### a. Results

#### **Descriptive Analysis**

Based on the results of the literature synthesis analyzed in this study, the development of studies on the integration of Deep Learning in the implementation of the Independent Curriculum in Early Childhood Education shows a growing trend in recent years. This increase is in line with the transformation of education policy that emphasizes the importance of learner-centered learning, the development of 21st-century competencies, and meaningful learning. Most of the studies were published in the 2022–2026 period, indicating that Deep Learning is a relatively new topic in Indonesian education discourse, especially after the introduction of the Independent Curriculum as a national policy.

The analyzed literature shows that research on Deep Learning is still dominated by primary and secondary education, while research specifically focused on Early Childhood Education is relatively limited. This situation indicates that the implementation of Deep Learning in Early Childhood Education (PAUD) is still in its early stages of development, requiring more empirical research to strengthen its conceptual foundation and practical implementation.

In terms of methodology, most research uses descriptive qualitative approaches, case studies, and field research focused on learning implementation. Quantitative and mixed methods research is emerging, but remains relatively small compared to qualitative research. These findings indicate that research on Deep Learning in Early Childhood Education (ECE) is still oriented toward exploring concepts, implementing, and understanding learning practices rather than testing models or measuring impact quantitatively.

#### **Main Findings and Research Trends**

The literature synthesis reveals several key themes that dominate research on the integration of Deep Learning into the implementation of the Independent Curriculum in Early Childhood Education. The first theme relates to meaningful learning. Most studies emphasize that Deep Learning is understood as a learning approach that encourages children to construct meaning through direct experience, environmental exploration, simple problem-solving, and social interaction. Meaningful learning enables children to connect new experiences with existing knowledge, resulting in deeper and more sustainable understanding.

The second theme relates to learning through play. Literature shows that the integration of Deep Learning in Early Childhood Education (PAUD) is generally implemented through structured play activities with clear learning objectives. Play is not merely viewed as a recreational activity, but as a primary means for children to develop thinking, creativity, communication, collaboration, and problem-solving skills. These findings demonstrate a strong alignment between the principles of Deep Learning and the learning philosophy of the Independent Curriculum.

The third theme is developing children's holistic competencies. Various studies have shown that the implementation of Deep Learning focuses not only on cognitive development but also on socio-emotional, language, moral, spiritual, and motor skills. This approach aligns with the characteristics

of the Independent Curriculum, which prioritizes holistic child development as the primary learning objective.

The fourth theme relates to the teacher's role as a learning facilitator. Literature shows that the successful implementation of Deep Learning is heavily influenced by the teacher's ability to design authentic learning experiences, encourage exploration, facilitate reflection, and create a safe and enjoyable learning environment. Therefore, teacher pedagogical competence is a crucial factor in supporting the successful implementation of Deep Learning in Early Childhood Education (ECE).

The fifth theme is the integration of Deep Learning with the principles of mindful, meaningful, and joyful learning. Numerous studies have shown that these three principles are the main foundation for implementing Deep Learning in the Independent Curriculum. Mindful, meaningful, and joyful learning has been proven to increase children's engagement in the learning process and support optimal competency development.

### **Differences and Debates in Theory and Perspective**

Although most research supports the implementation of Deep Learning in early childhood education, there are some differing perspectives in the literature. Some researchers view Deep Learning as a new pedagogical approach capable of addressing the needs of 21st-century learning. This perspective emphasizes that Deep Learning provides more space for children to construct knowledge through authentic and reflective experiences. Conversely, some studies argue that the principles of Deep Learning have long been present in constructivism theory, experiential learning, and learning through play. From this perspective, Deep Learning is seen not as a new concept, but rather as a revitalization of various previously developed learning theories within the context of new educational policies. Another debate arises regarding the implementation of Deep Learning in Early Childhood Education (ECE). Some studies emphasize the importance of free exploration and fully child-centered learning. Others argue that teachers still need to provide adequate scaffolding and guidance so that the learning process can achieve the desired developmental goals. These differing perspectives indicate that the implementation of Deep Learning still requires the development of a clearer and more contextualized pedagogical model tailored to the characteristics of early childhood education.

### **Methodological Approaches Used by Researchers**

The study results indicate that the most dominant methodological approach used in research on Deep Learning and the Independent Curriculum in Early Childhood Education (PAUD) is descriptive qualitative research. This approach is used to explore teachers' experiences, learning practices, and the dynamics of policy implementation in the field. Case studies are also widely used because they allow researchers to understand the implementation of Deep Learning in depth in specific contexts. Classroom action research is beginning to be used to evaluate the effectiveness of specific learning strategies in supporting meaningful learning in early childhood. Quantitative research remains relatively limited. Most quantitative studies focus on measuring learning engagement, creativity, critical thinking skills, or the development of children's competencies after participating in specific learning activities. Mixed methods research is also still rare, despite its potential to yield a more comprehensive understanding of Deep Learning implementation in the PAUD context.

**b. Research Gaps****Theoretical Gaps**

The literature shows that the concept of Deep Learning is still being developed through various different theoretical perspectives. Some studies link it to constructivism theory, while others link it to experiential learning, meaningful learning, and reflective learning. This situation indicates that there is no integrated conceptual framework specifically to explain the implementation of Deep Learning in the context of Early Childhood Education based on the Independent Curriculum. Another theoretical gap is evident in the lack of studies that explicitly link Deep Learning, learning through play, differentiated learning, and the Pancasila Student Profile. Most studies discuss these concepts separately, so the conceptual relationships between these variables still require further development.

**Methodological Gaps**

From a methodological perspective, research on Deep Learning in Early Childhood Education (ECE) is still dominated by descriptive qualitative approaches and case studies. The use of quantitative approaches, mixed methods, longitudinal studies, and experimental research is still very limited. Consequently, empirical evidence regarding the effectiveness of Deep Learning on various aspects of child development remains insufficient. The literature also shows that the use of Systematic Literature Reviews (SLRs), bibliometric analysis, and meta-analysis in studies of Deep Learning in ECE is still relatively limited. This situation results in the development of knowledge in this field not being comprehensively mapped.

**Contextual Gaps**

Most research is conducted in the context of primary and secondary education, while research specifically focusing on Early Childhood Education (ECE) remains limited. This situation indicates a significant contextual gap because the developmental characteristics of early childhood differ from those of students at other levels of education. This contextual gap is also evident in the predominance of research conducted in urban areas and educational institutions with relatively good resources. Research on the implementation of Deep Learning in ECE in rural areas, 3T (frontier, outermost, and disadvantaged) regions, and institutions with limited resources is still relatively rare.

**Future Research Agenda**

Based on the various gaps identified, future research needs to develop a conceptual model that integrates Deep Learning, the Independent Curriculum, play-based learning, differentiated learning, and holistic early childhood competency development within a comprehensive theoretical framework. Further research should also expand the use of quantitative approaches, mixed methods, and longitudinal studies to generate stronger empirical evidence regarding the impact of Deep Learning on early childhood development. Studies in more diverse contexts, including rural areas and early childhood education institutions with different characteristics, are also needed to broaden understanding of Deep Learning implementation in various educational settings. Furthermore, future research needs to develop valid measurement instruments to evaluate Deep Learning implementation in early childhood education so that the effectiveness of the approach can be measured more objectively and systematically. Thus, the development of Deep Learning theory and practice in the implementation of the Independent Curriculum can be conducted in a more focused and evidence-based manner.

## 5. Conclusion

Based on the results of the Systematic Literature Review (SLR), the integration of Deep Learning in the implementation of the Independent Curriculum in Early Childhood Education (PAUD) shows significant potential in supporting child-centered, meaningful, reflective, and enjoyable learning. The literature synthesis shows that Deep Learning aligns with the philosophy of the Independent Curriculum through the implementation of meaningful, mindful, and joyful learning that encourages the holistic development of children's competencies, including cognitive, socio-emotional, language, character, and creativity aspects. The study also indicates that research on Deep Learning in the PAUD context is still relatively limited and dominated by descriptive qualitative approaches. Several gaps were found, especially in theoretical, methodological, and contextual aspects, which indicate the need to develop a more integrated conceptual model and more diverse empirical research. This study contributes by mapping research trends, key findings, and literature gaps related to the integration of Deep Learning in the Independent Curriculum in PAUD. These findings are expected to serve as a reference for educators, PAUD managers, curriculum developers, and researchers in developing more effective learning practices and supporting future research agendas in the field of early childhood education.

## 6. References

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