NUSRA: Jurnal Penelitian dan Ilmu Pendidikan
Volume 7, Issue 3, June 2026
DOI: https://doi.org/10.55681/nusra.v7i3.6401
Homepage: ejournal.nusantaraglobal.ac.id/index.php/nusra

p-ISSN: 2715-114X
e-ISSN: 2723-4649
pp. 1469-1487

PEDAGOGICAL COMPETENCE IN EARLY CHILDHOOD EDUCATION: A SYSTEMATIC LITERATURE REVIEW ON ASSESSMENT AND OBSERVATION PRACTICES

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Article History

Received: 15 May 2026
Revised: 13 June 2026
Published: 28 June 2026

ABSTRACT

Pedagogical competence among early childhood education (ECE) teachers is closely related to teachers' ability to observe, assess, document, and interpret children's development. Although assessment is essential in ECE, teachers still face administrative workload, limited assessment literacy, and uneven digital competence. This systematic literature review examines assessment and observation practices as dimensions of teachers' pedagogical competence. Following PRISMA procedures, 41 peer-reviewed articles published between 2022 and January 2026 were selected from Scopus, Web of Science, Google Scholar, and GARUDA. The main inclusion criteria covered ECE contexts, empirical or rigorous review articles, Indonesian or English language publications, full-text access, and indexed journals. Thematic synthesis was conducted through coding and clustering. The findings show a shift from administrative reporting toward authentic, reflective, and child-centred assessment through continuous observation, pedagogical documentation, portfolios, and digital tools. Assessment quality depends on child development knowledge, observation skill, documentation competence, reflective capacity, and digital competence. This review contributes a conceptual mapping of ECE assessment competence and highlights the need for professional development, ethical digital documentation, and institutional support.

Keywords: *Pedagogical Competence, Early Childhood Assessment, Observation of Child Development, Pedagogical Documentation, Early Childhood Education.*

How to cite: Widiana, I. T., Arifin, I., Yafie, E., & Putra, Y. D. (2026). Pedagogical Competence in Early Childhood Education: A Systematic Literature Review on Assessment and Observation Practices. *NUSRA : Jurnal Penelitian Dan Ilmu Pendidikan*, *7*(3), 1469–1487. https://doi.org/10.55681/nusra.v7i3.6401

INTRODUCTION

Pedagogical competence is a central element of professionalism among early childhood education (ECE) teachers (Yafie et al., 2022). It includes the ability to understand children's developmental characteristics, organise learning experiences, conduct observation, design assessment, and use assessment information to guide pedagogical decisions (Suswanti et al., 2025). In ECE, this competence is important because children develop through varied pathways and require learning support that is responsive to their individual needs and contexts (Okayanti et al., 2023). In Indonesia, pedagogical competence is also formally recognised as a core aspect of teacher professionalism, which means that the quality of early childhood learning is closely related to teachers' capacity to make informed classroom decisions (UU No. 14 Tahun 2005, 2005).

Assessment and observation are therefore not merely technical activities, but part of teachers' daily pedagogical work. Through continuous observation in natural learning situations, teachers identify children's interests, strengths, needs, and developmental difficulties (Yafie, Anisa, et al., 2024). The information obtained from observation can then be used to plan appropriate stimulation, adjust learning activities, and communicate children's progress to parents or other stakeholders (Yafie et al., 2021). For this reason, assessment in ECE needs to be holistic and contextual, focusing not only on academic achievement but also on play, social interaction, language expression, motor development, and emotional growth (Aisyah et al., 2025).

Previous studies have shown that assessment can support instructional planning, reflection, and quality improvement in ECE. Play-based and authentic assessment, for example, enables teachers to collect developmental information from children's everyday activities and interactions (Susmawati & Sukinah, 2025). Pedagogical documentation also provides a reflective lens through which teachers can interpret children's learning processes and monitor growth over time (Fonsén et al., 2023). Similarly, systematic documentation helps teachers connect assessment findings with developmental stimulation that is suitable for each child (Izzati & Hayati, 2025).

Despite these benefits, the implementation of assessment and observation in ECE remains challenging. Studies in the Indonesian context show that teachers often struggle to record children's developmental progress systematically and consistently (Tutupary et al., 2023). Administrative workload, limited assessment literacy, and insufficient time for documentation may reduce assessment to a reporting requirement rather than a basis for pedagogical reflection (Herman, Sultan, & Suardi, 2025). These challenges indicate that assessment competence needs to be understood as part of broader pedagogical competence, not as a separate administrative skill.

Digital technology has opened new possibilities for improving assessment and observation practices. Digital documentation applications, e-portfolios, and technology-based assessment systems can help teachers store, organise, and review developmental data more efficiently (Herut & Setlhako, 2025). Such tools may also support more specific feedback and better continuity between observation,

documentation, and instructional planning (Herman, Sultan, & Suardi, 2025). Nevertheless, technology does not automatically improve assessment quality. Limited digital literacy, inadequate training, unequal access to devices, data privacy concerns, and ethical issues in using children's photos or videos may create additional burdens if digital tools are not accompanied by pedagogical guidance and institutional support (Cowan & Flewitt, 2023; Dardanou et al., 2023; Jahreie, 2021).

Existing studies on pedagogical competence among ECE teachers remain fragmented across several themes, including authentic assessment, developmental observation, learning documentation, pedagogical reflection, and digital technology (Aliu-Gashi & Iliev, 2024; Herman, Sultan, Suardi, et al., 2025; Oktaria et al., 2026; Thanh Huyen et al., 2026). Although these themes are closely connected, relatively few studies have synthesised how assessment and observation together form a dimension of teachers' pedagogical competence (Børte et al., 2023; Khotimah & Reza, 2022; F. D. Lestari et al., 2025). This gap is important because teachers' ability to observe, document, interpret, and respond to children's development determines whether assessment becomes a meaningful pedagogical process or merely an administrative record.

Based on this gap, the purpose of this article is to conduct a systematic literature review of assessment and observation practices in child development within the framework of teachers' pedagogical competence. The review aims to map research trends, identify the pedagogical competencies required for assessment and observation, and analyse the challenges and opportunities for developing these competencies, including the integration of digital technology. In addition to contributing to the conceptual discussion on ECE assessment, this review is expected to provide practical guidance for teachers, institutions, and policymakers in strengthening assessment practices that are systematic, reflective, ethically responsible, and child-centred.

RESEARCH METHOD

1. Research Design

The present study performed a Systematic Literature Review (SLR) to methodically analyse assessment and observation practices on child development through the pedagogical knowledge of early childhood education teachers. We chose this approach because it allows for a systematic, transparent synthesis of published empirical findings across various studies. An SLR also allows researchers to recognize research trends, dominant themes, research gaps and future directions/conclusions in the field of teacher's pedagogical competence in assessment and observation practice.

A systematic review following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines was carried out to ensure that the processes of article identification, selection and analysis were performed in a systematic and transparent manner (Page et al., 2021). This study also employed a systematic mapping approach in addition to synthesising the literature to map trends of publications, characteristics and dominant themes present across studies. The research process included three main steps: (1) identify articles, (2) screen and select articles from the initial pool of articles, and (3)

extract and analyze data from selected articles.

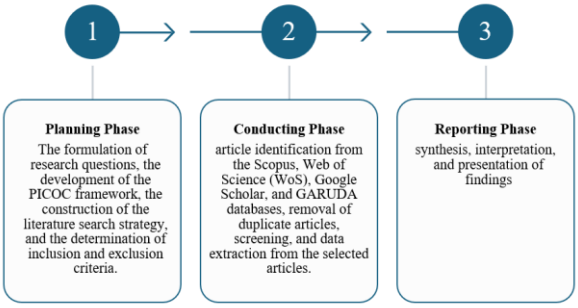

Figure 1. Research Procedures

2. Literature Search Strategy

To identify articles that had a close range to the scope of the study, the literature search strategy was created according to PICOC criteria. MethodologyThe searches were performed systematically in January 2026 using Scopus, Web of Science, Google Scholar and GARUDA databases. These databases were chosen due to the wide coverage they provide of quality scholarly outlets available in education and early childhood education.

In this research, keywords related to teachers' pedagogical competence and assessment and observation as a practices in early childhood education conducted an article search. The keywords were connected through Boolean operators (AND and OR) to narrow down the search in accordance with the review focus.

Tabel 1. Search Database and Search String

Database	Search String
Scopus	TITLE-ABS-KEY ("pedagogical competence" OR "teacher competence" OR "pedagogical skills") AND TITLE-ABS-KEY ("assessment practices" OR observation OR "authentic assessment" OR "pedagogical documentation") AND TITLE-ABS-KEY ("early childhood education" OR preschool OR kindergarten OR "early years education")
Web of Science	TS=("pedagogical competence" OR "teacher competence" OR "pedagogical skills") AND TS=("assessment practices" OR observation OR "authentic assessment" OR "pedagogical documentation") AND TS=("early childhood education" OR preschool OR kindergarten OR "early years education")
Google Scholar	("pedagogical competence" OR "teacher competence") AND ("assessment practices" OR observation OR "authentic assessment") AND ("early childhood education" OR preschool OR kindergarten)
GARUDA	("kompetensi pedagogik" OR "kompetensi guru") AND ("asesmen" OR "observasi perkembangan anak") AND ("pendidikan anak usia dini" OR PAUD OR TK)

The search was restricted to articles published between 2022 and 2025 to ensure that the selected studies reflected recent developments in assessment and observation practices.

3. Inclusion and Exclusion Criteria

To ensure the relevance, quality, and transparency of the study selection process, this review applied predefined inclusion and exclusion criteria, as shown in Table 2.

Table 2. Inclusion and Exclusion Criteria

No	Inclusion Criteria	Exclusion Criteria	Rationale
1	Articles published in peer-reviewed journals	Conference proceedings, books, theses, dissertations, and reports	To ensure the academic quality of the sources

2	Studies addressing assessment, developmental observation, and teachers' pedagogical competence	Studies unrelated to assessment, observation, or pedagogical competence	To maintain alignment with the review focus
3	Studies situated in early childhood education contexts	Studies situated in primary, secondary, or higher education contexts	To ensure contextual consistency
4	Empirical studies using qualitative, quantitative, or mixed-methods designs, as well as complex review studies such as SLRs and meta-analyses	Conceptual papers and simple narrative literature reviews	To prioritise empirical evidence and avoid duplication of synthesis findings
5	Articles written in Indonesian or English	Articles written in languages other than Indonesian or English	To facilitate accurate analysis and interpretation
6	Full-text articles	Articles without full-text access	To enable comprehensive data extraction
7	Articles published between 2022 and 2025	Articles published outside the specified period	To capture recent developments in the field
8	Articles indexed in SINTA 1–3, Scopus, or Web of Science (WoS)	Articles from non-indexed or non-academic sources	To ensure the credibility and reliability of the data sources

These criteria were applied during the systematic screening and selection process in accordance with the PRISMA stages, as illustrated in the research flow diagram (see Figure 2).

4. Data Extraction and Analysis

The literature search conducted in the Scopus, Web of Science (WoS), Google Scholar, and GARUDA databases initially identified 430 articles. After removing 96 duplicate records, 334 articles were screened based on their titles and abstracts. At this stage, 248 articles were excluded because they did not align with the focus of the study, for example, they did not address teachers' pedagogical competence, assessment and observation of child development, or early childhood education contexts.

A total of 86 articles then proceeded to the full-text review stage for eligibility assessment. Of these, 45 articles were excluded because they did not meet the inclusion criteria, such as using research methods outside the specified criteria, being unavailable in full-text format, being published outside the 2022–2025 period, or originating from journals not indexed in SINTA 1–3, Scopus, or Web of Science. Accordingly, 41 articles were included in this review. The article selection process is presented in the PRISMA flow diagram (Figure 2).

Data extraction was conducted using a structured analysis format that included bibliographic information, research objectives, research methods, research subjects, forms of assessment and observation practices, pedagogical competence examined, and the main findings of each study. In addition, the extraction process identified the use of digital technology in assessment and observation practices related to child development.

Data analysis was conducted based on three main focuses aligned with the research questions, as presented in Table 3.

Table 3. Research Questions

Research Questions (RQ)	**Research Objectives**
RQ1. How are assessment and observation practices in child development represented in studies on the pedagogical competence of early childhood education teachers?	To identify how assessment and observation practices in child development are represented in studies related to teachers' pedagogical competence.
RQ2. What pedagogical competencies are required by teachers to conduct assessment and observation of child development?	To analyse the pedagogical competencies required by teachers to implement assessment and observation of child development.
RQ3. What challenges and opportunities exist for developing teachers' pedagogical competence in assessment and observation practices related to child development, including through the use of digital technology?	To examine the challenges and opportunities for developing teachers' pedagogical competence in assessment and observation practices related to child development, including through the use of digital technology.

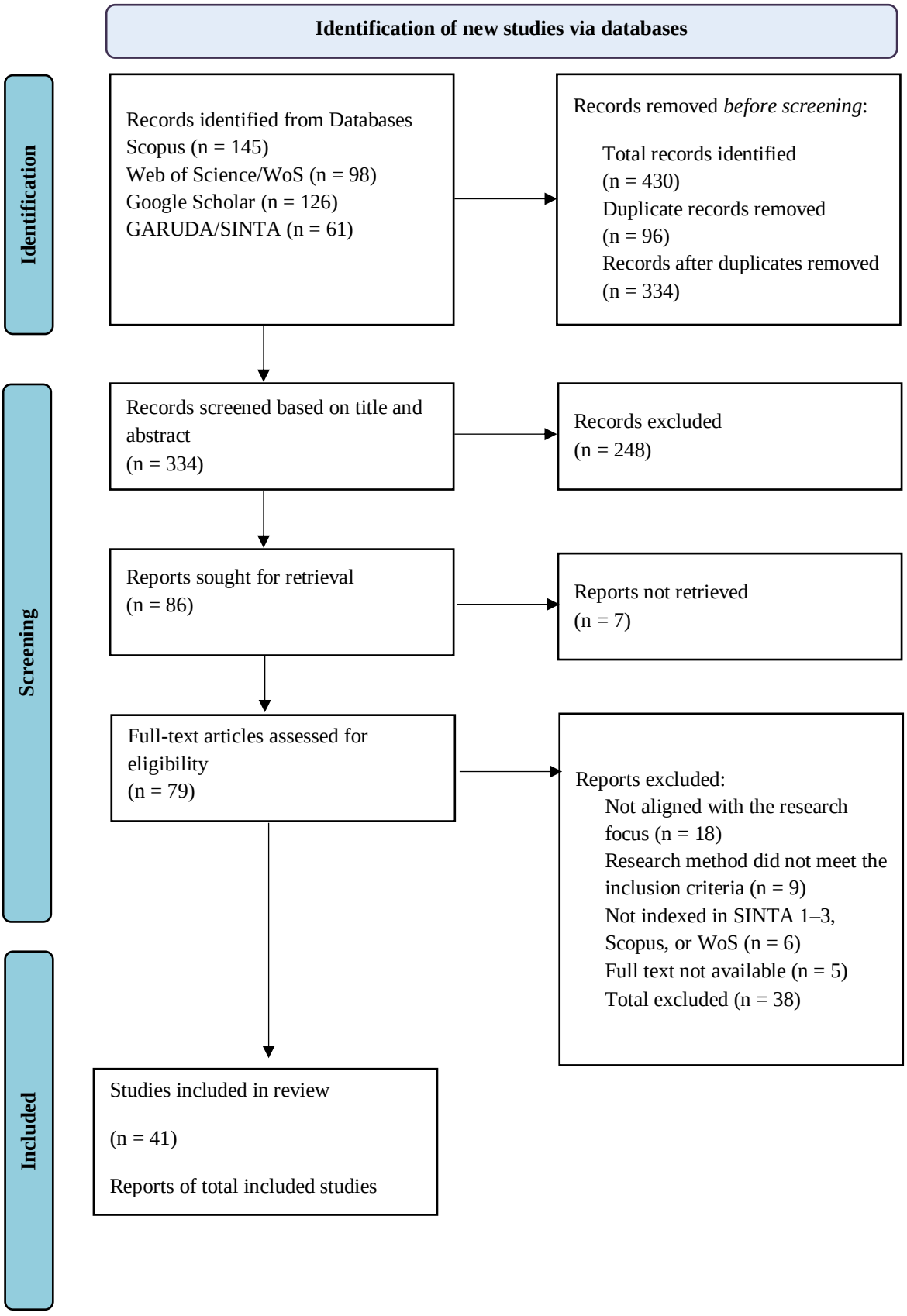

Figure 2. Systematic Review Diagram based on PRISMA (Page et al., 2021)

RESULT AND DISCUSSION

1. Representation of Assessment and Observation Practices in Studies on Teachers' Pedagogical Competence

Analysis of the selected articles showed that research on pedagogical competence in ECE increasingly positions assessment and observation as pedagogical practices rather than merely administrative procedures. The included studies addressed authentic assessment, developmental observation, pedagogical documentation, portfolio assessment, reflective use of assessment data, and the integration of digital tools in documentation.

Distribution of Studies by Country

The distribution of the selected studies by country shows that Indonesia contributed the largest proportion of publications, representing 24.39% of the total articles reviewed. This was followed by Finland (12.20%), Turkey and China (9.76% each), and Australia (7.32%). Countries represented by two articles were Ethiopia, Norway, and the United States (4.88% each), while New Zealand, Vietnam, Pakistan, Tanzania, Sweden, Japan, Italy, the United Kingdom, and South Korea were represented by one article each (2.44%).

The relatively high proportion of studies from Indonesia suggests that teachers' pedagogical competence in assessment and developmental observation has become an important area of scholarly attention, particularly in relation to authentic assessment practices, teachers' digital competence, and learning evaluation in early childhood education. By contrast, studies from Finland more frequently focused on pedagogical documentation, planning and assessment practices, and teachers' pedagogical reflection in ECE settings. The distribution also indicates that digital documentation and technology-supported assessment have become cross-national issues rather than concerns limited to one country context.

Table 4. Distribution of Articles by Country

Country	Number of Articles	Percentage (%)
Indonesia	10	24.39
Finland	5	12.20
Turkey	4	9.76
China	4	9.76
Australia	3	7.32
Ethiopia	2	4.88
Norway	2	4.88
United States	2	4.88
New Zealand	1	2.44
Vietnam	1	2.44
Pakistan	1	2.44
Tanzania	1	2.44
Sweden	1	2.44
Japan	1	2.44
Italy	1	2.44
United Kingdom	1	2.44
South Korea	1	2.44
Total	41	100.00

Distribution of Studies by Publication Year

Based on the year of publication, studies on teachers' pedagogical competence in assessment and observation practices related to child development showed a considerable increase during the 2023–2025 period. The highest number of publications was recorded in 2025, with 13 articles (31.71%), followed by 2023 with 11 articles (26.83%) and 2024 with 8 articles (19.51%). Studies published in 2022 accounted for 6 articles (14.63%), while 3 articles (7.32%) were early 2026 publications identified during the January 2026 search.

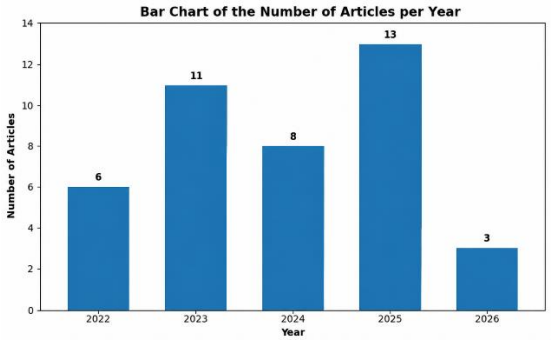

Figure 3. Bar Chart of Publication Frequency by Year

The increase in the number of publications from 2023 to 2025 indicates that issues related to assessment, developmental observation, and teachers' pedagogical competence have gained growing scholarly attention, particularly in relation to digitalisation of assessment, pedagogical documentation, and teachers' digital competence in early childhood education. The research trend graph shows the pattern presented in Figure 4.

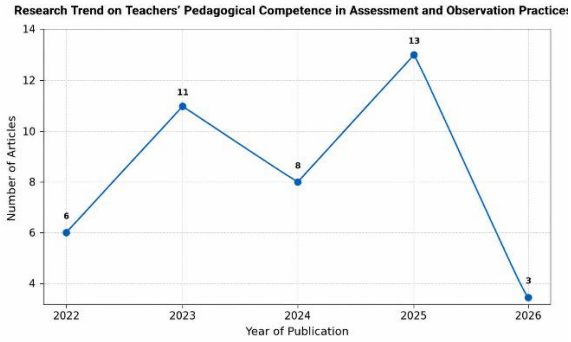

Figure 4. Research Trend

The trend graph indicates an overall increase in research on teachers' pedagogical competence in assessment and developmental observation practices from 2022 to 2025. The number of publications increased from 6 articles in 2022 to 13 articles in 2025, marking the highest point within the review period. The three articles recorded in 2026 should be interpreted with caution because the search was conducted in January 2026 and may reflect early access or early indexing rather than a complete annual publication trend.

Representative Findings on Assessment Practices and Teachers' Pedagogical Competence

Following the analysis of 41 selected articles, this review identified several important findings related to assessment practices and teachers' pedagogical competence. The themes in Table 5 were generated through coding and clustering of the extracted findings, rather than by counting keywords alone. This approach allowed the review to identify recurring patterns across studies and interpret their relationships within the broader framework of pedagogical competence.

Table 5. Dominant Research Topics

Dominant Topic	Research Focus	(%)	References
Assessment and observation practices in child development	Authentic assessment, developmental observation, anecdotal records, learning evaluation, portfolio assessment, and reporting of children's developmental progress	34.15	(Alacam, 2024; Cowan & Flewitt, 2023; Gan et al., 2023; Heikka et al., 2023; Izzati & Hayati, 2025; Kihwele et al., 2025; A. Lestari et al., 2025; Margrain et al., 2022; Milania & Murniati, 2022a; Oktaria et al., 2026; Primanisa et al., 2024; Tutupary et al., 2023)
Pedagogical documentation	Documentation of children's development, pedagogical reflection, photo- and video-	21.95	(Gangal & Yilmaz, 2023; Margrain et al., 2022; Matsumoto et al., 2023; Nuttall et al., 2023; Purnama et al., 2022; Restiglian et al., 2023)

Dominant Topic	Research Focus	(%)	References
	based documentation, and digital documentation		
Teachers' digital competence	Digital literacy, digital assessment, digital portfolios, technology-supported documentation, and emerging discussion of artificial intelligence	26.83	(Cowan & Flewitt, 2023; Dardanou et al., 2023; Forsling, 2022; Herman, Sultan, & Suardi, 2025; Khotimah & Reza, 2022; Su & Yang, 2024; Undheim & Ploog, 2024)
Development of teachers' pedagogical competence	Professional development, learning communities, pedagogical competence, blended learning, and pedagogical leadership	17.07	(Heikka et al., 2025; Herut & Setlhako, 2025; Kangas et al., 2025; Sa'adah et al., 2025; Susmawati & Sukinah, 2025)

As shown in Table 5, research on pedagogical competence in assessment and developmental observation is dominated by studies of assessment and observation practices, followed by teachers' digital competence, pedagogical documentation, and the development of teachers' pedagogical competence. The coding process also shows that these topics are interrelated rather than separate. Assessment and observation provide the empirical basis for documentation; documentation supports pedagogical reflection; and reflection informs child-centred learning decisions. Digital competence mediates this sequence by helping teachers capture, store, retrieve, and communicate assessment evidence more systematically. At the same time, digital tools may increase workload when teachers lack institutional support, clear procedures, or ethical guidance.

2. Teachers' Pedagogical Competence in Assessment and Developmental Observation Practices

The results suggest a need for an integrated set of pedagogical competencies related to developmental observation and assessment practices. The five competency categories in Table 6 were generated from coding and clustering the extracted findings. Codes related to developmental milestones and children's needs were grouped as understanding of child development; codes related to systematic noticing and recording were grouped as observation competence; codes concerning instruments, portfolios, and reports were grouped as assessment and documentation competence; codes describing interpretation and instructional use of data were grouped as reflective pedagogical competence; and codes concerning e-portfolios, documentation platforms, and technology use were grouped as digital competence.

Table 6. Teachers' Pedagogical Competence in Assessment and Observation Practices

Pedagogical Competence	Competence Description	Focus of Research Findings	References
Understanding of child development	The ability to understand children's characteristics,	Teachers need to understand child development in order to conduct observations and	(Aliu-Gashi & Iliev, 2024; Ranta et al.,

Pedagogical Competence	Competence Description	Focus of Research Findings	References
	needs, and developmental stages	interpret assessment results appropriately	2023; Thanh Huyen et al., 2026)
Observation competence	The ability to conduct systematic and continuous observation	Authentic observation helps teachers obtain more objective data on children's developmental progress	(Alacam, 2024; A. Lestari et al., 2025; Matsumoto et al., 2023)
Assessment and documentation competence	The ability to use assessment instruments and prepare documentation of children's developmental progress	Portfolio assessment, anecdotal records, and pedagogical documentation are among the most frequently used instruments	(Gangal & Yilmaz, 2023; Margrain et al., 2022; Tutupary et al., 2023)
Reflective pedagogical competence	The ability to use assessment results as a basis for instructional planning and learning reflection	Assessment is understood as part of pedagogical reflection and instructional decision-making	(Heikka et al., 2022, 2025; Restiglian et al., 2023)
Digital competence	The ability to utilise digital technology in assessment and observation	The use of digital portfolios, observation applications, and digital documentation has increased in classroom practice	(Cowan & Flewitt, 2023; Herman, Sultan, & Suardi, 2025; Yang et al., 2024)

The results indicate that assessment and developmental observation practices demand a wide set of mutually connected pedagogical competencies. Understanding child development helps teachers decide what should be observed; observation competence produces developmental evidence; documentation competence organises the evidence; reflective competence transforms evidence into pedagogical decisions; and digital competence can support the whole process when used ethically and responsibly. Thus, pedagogical competence in assessment and observation functions as an integrated cycle rather than a set of separate skills.

3. Challenges and Opportunities for Developing Teachers' Pedagogical Competence in Assessment and Developmental Observation Practices

The analysis also identified a persistent tension between the pedagogical purpose of assessment and the administrative demands attached to documentation. Teachers are expected to produce systematic records, but many studies report limited time, uneven assessment literacy, and varied digital readiness. Opportunities emerge when assessment is supported by professional development, collaborative learning communities, and digital tools that are introduced with clear pedagogical and ethical guidance.

Table 7. Challenges and Opportunities for Developing Teachers' Pedagogical Competence

Aspect	Challenges	Opportunities
Assessment administration (Cowan & Flewitt, 2023; Heikka et al., 2023; Tutupary et al., 2023)	Teachers face difficulties in documenting observation results consistently due to high administrative workloads	The use of digital documentation supports more systematic recording and storage of children's developmental data
Assessment competence (Kangas et al., 2025; Milania & Murniati, 2022a; Primanisa et al., 2024)	Teachers continue to experience difficulties in interpreting observation results and preparing reports on children's developmental progress	Training in authentic assessment and pedagogical reflection supports improvements in the quality of learning evaluation
Digital literacy (Forsling, 2022; Herman, Sultan, & Suardi, 2025; Yang et al., 2024)	Teachers' ability to use assessment and observation technologies remains varied	Digital portfolios, observation applications, and digital assessment platforms support assessment efficiency
Teacher professional development (Herut & Setlhako, 2025; Sa'adah et al., 2025; Susmawati & Sukinah, 2025)	Training related to assessment and observation of child development remains limited	Professional development and learning communities support the strengthening of teachers' pedagogical competence
Digital technology implementation (Dardanou et al., 2023; Nuttall et al., 2023; Herman et al., 2025)	Limited facilities, weak institutional support, privacy concerns, and additional digital workload hinder the integration of technology into assessment practices	Digital technology can support assessment that is more reflective, well-documented, and based on children's developmental data when supported by ethical guidelines and institutional assistance

The relationship between challenges and opportunities suggests that technology is not a stand-alone solution. Digital portfolios and documentation platforms may reduce fragmented record keeping, but they may also create new risks related to data privacy, consent for photo and video documentation, unequal access to devices, and additional digital workload. Therefore, strengthening pedagogical competence requires assessment literacy, ethical digital competence, school-level support, and professional communities that help teachers interpret assessment data for child-centred learning.

DISCUSSION

1. Assessment and Observation Practices in Studies on Teachers' Pedagogical Competence

The findings show that assessment and observation practices are represented as a pedagogical cycle: teachers observe children's activities, document evidence, interpret developmental meaning, and use the interpretation to plan further learning. This pattern clarifies that assessment in ECE is not limited to reporting outcomes; it is a reflective process that connects children's everyday experiences with teachers' instructional decisions. Studies by Heikka et al. (2023), Margrain et al. (2022), and Tutupary et al. (2023) support this interpretation by showing that authentic observation and pedagogical documentation help teachers understand children's needs, interests, and learning trajectories.

Cross-country patterns also show that the emphasis of assessment research is shaped by policy and professional contexts. Finnish studies tend to connect assessment

with pedagogical documentation and teacher reflection, while Indonesian studies more frequently discuss authentic assessment implementation and teachers' competence in learning evaluation (Milania & Murniati, 2022a; Oktaria et al., 2026). Australian and Chinese studies more often examine digital platforms and technology-mediated documentation (Cowan & Flewitt, 2023; Su & Yang, 2024). These differences indicate that the central issue is not only whether teachers assess children, but how assessment evidence is transformed into child-centred pedagogical decisions.

2. Teachers' Pedagogical Competence in Assessment and Observation Practices

The results indicate that assessment and observation practices require a combination of child development knowledge, observation skills, assessment and documentation competence, reflective pedagogical competence, and digital competence. These findings are consistent with a sociocultural view of early childhood learning. From a Vygotskian perspective, children's development occurs through social interaction, guided participation, and scaffolding within meaningful activities (Zhou, 2024). Observation helps teachers identify what children can do independently and what they can accomplish with appropriate support. Assessment, therefore, becomes a way to recognise children's emerging abilities and plan scaffolding that matches their developmental needs.

Within this framework, authentic assessment should be conducted during everyday play and interaction, rather than separated from the learning context (Oralie McAfee, Deborah J. Leong, 2016). Teachers need to interpret observation evidence carefully, connect it with developmental knowledge, and use it to design responsive learning experiences. Digital competence extends this process by helping teachers organise evidence through portfolios, observation applications, and documentation platforms; however, the value of these tools depends on teachers' pedagogical reasoning and ethical judgement.

3. Challenges and Opportunities for Developing Teachers' Pedagogical Competence

The findings also show that the development of pedagogical competence is constrained by workload, limited assessment literacy, uneven digital skills, and insufficient training. These barriers can shift assessment away from reflection and toward administrative compliance. The challenge is not only technical, but also structural: teachers need time, institutional support, and professional guidance to conduct observation and documentation meaningfully. Digital preparedness is particularly important because technology-based assessment requires operational skills, data interpretation, and ethical documentation (Dardanou et al., 2023; Forsling, 2022).

At the same time, professional development, learning communities, and digital documentation tools provide opportunities to strengthen assessment quality (KÜÇÜKOBA, 2023; Ranta et al., 2023). Digital portfolios and child observation applications can support more organised records of developmental progress, while communities of practice can help teachers discuss evidence and make pedagogical decisions (Herut & Setlhako, 2025; Su & Yang, 2023; Undheim & Ploog,

2024). However, digitalisation must be approached critically. Schools should establish safeguards for children's data privacy, parental consent for photo or video documentation, equitable access to devices, and realistic workload expectations. In this sense, technology should support reflective assessment, not add another layer of administration.

Conceptual Contribution of the Review

Based on the synthesis, this review proposes a conceptual mapping in which child development knowledge informs observation competence; observation produces evidence for assessment and documentation; documentation supports reflective pedagogical competence; and reflective competence informs child-centred learning. Digital competence intersects with each stage as an enabling competence, while ethical and institutional support moderates the quality of implementation. This mapping is presented in Figure 5.

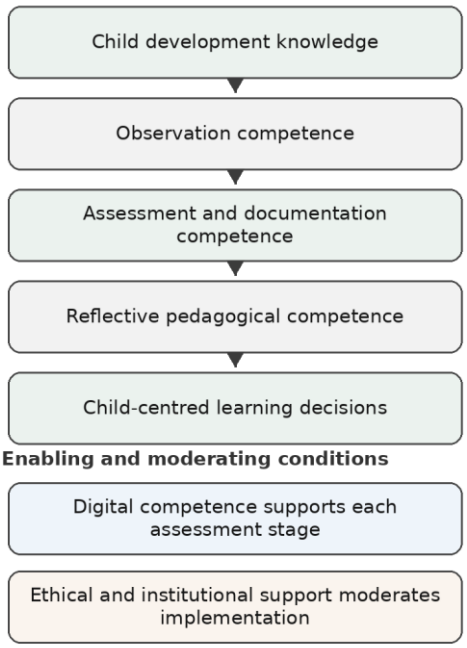

Figure 5. Conceptual Mapping of Pedagogical Competence in Early Childhood Assessment and Observation

CONCLUSION

This review answers the three research questions as follows. First, assessment and observation practices in studies on ECE teachers' pedagogical competence are represented mainly through authentic assessment, continuous observation, portfolio assessment, pedagogical documentation, and increasingly digital documentation. These practices indicate a shift from administrative reporting toward reflective and child-centred assessment. Second, the pedagogical competencies required include understanding of child development, systematic observation skills, assessment and documentation competence, reflective use of assessment data, and digital competence. These competencies are interrelated because observation evidence must be interpreted and transformed into responsive learning decisions. Third, the main challenges are administrative workload, limited assessment literacy, uneven digital competence, inadequate professional training, and limited institutional support. The main opportunities are professional development, learning communities, digital portfolios, and documentation platforms that can support more systematic and reflective assessment.

This SLR contributes by mapping assessment and observation as an integrated dimension of pedagogical competence in early childhood education. It also highlights the need for ethical digital documentation, especially regarding children's privacy, consent for photo and video evidence, and

equitable access to technology. Although several studies discuss digital documentation, evidence on artificial intelligence in assessment and developmental observation remains limited. Therefore, future research may examine AI as an emerging opportunity, particularly in relation to ethical use, teacher decision-making, and the extent to which AI-supported tools can help personalise learning without reducing teachers' professional judgement.

REFERENCES

Aisyah, E. N., Yafie, E., & Atmoko, A. (2025). Assessing Teacher Readiness in Early Childhood Education: An Analysis of the 2025 UM PPG Trial Question Instrument. *Journal of English Language and Education*, *10*(6), 37–43. https://doi.org/10.31004/jele.v10i6.1510

Alacam, N. (2024). Assessment and Documentation Methods in Early Childhood Education: Cases from Türkiye and the United States. *Baskent University Journal of Education*, *11*(2), 132–143. https://dergipark.org.tr/en/pub/bujoe/article/1357032

Aliu-Gashi, M., & Iliev, D. (2024). Pedagogical Skills of Educators Working with Children Aged 3-6 . *Pakistan Journal of Life and Social Sciences*, *22*(2), 20486–20498. https://pjlss.edu.pk/pdf_files/2024_2/20486-20498.pdf

Aromataris, E., & Munn, Z. (Eds.). (2020). JBI Manual for Evidence Synthesis. JBI. https://doi.org/10.46658/JBIMES-20-01

Børte, K., Lillejord, S., Chan, J., Wasson, B., & Greiff, S. (2023). Prerequisites for teachers' technology use in formative assessment practices: A systematic review. *Educational Research Review*, *41*, 100568. https://doi.org/10.1016/J.EDUREV.2023.100568

Cowan, K., & Flewitt, R. (2023). Moving from paper-based to digital documentation in Early Childhood Education: democratic potentials and challenges. *International Journal of Early Years Education*, *31*(4), 888–906. https://doi.org/10.1080/09669760.2021.2013171

Dardanou, M., Hatzigianni, M., & Kewalramani, S. (2023). Professional development for digital competencies in early childhood education and care: A systematic review. In *Organisation for Economic Co-operation and Development*. https://doi.org/10.1787/a7c0a464-en

Fonsén, E., Szecsi, T., Kupila, P., Liinamaa, T., Halpern, C., & Repo, M. (2023). Teachers' pedagogical leadership in early childhood education. *Educational Research*, *65*(1), 1–23. https://doi.org/10.1080/00131881.2022.2147855

Forsling, K. (2022). Cooperation for developing digital competence in preschool – Challenges for teacher education – students – practicum preschools. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186X.2022.2141512

Gan, Y., Zhang, J., Kharabi-Yamato, L., Su, Y., Zhang, J., Jiang, Y., Hui, Y., & Li, H. (2023). The Unique Predictive Value of Dynamic Assessment of Character Decoding in Reading Development of Chinese Children from Grades 1 to 2. *Scientific Studies of Reading*, *27*(3), 215–231. https://doi.org/10.1080/10888438.2022.2143271

Gangal, M., & Yilmaz, A. (2023). The effects of pedagogical documentation on preschool teachers' classroom management skills. *Teaching and Teacher Education*, *133*, 104289.

https://doi.org/10.1016/J.TATE.2023.104289

Heikka, J., Hirvonen, R., Kahila, S., Pitkäniemi, H., Yada, T., & Hujala, E. (2023). Links between teachers' planning, assessment and development time and implementation of curriculum in early childhood education. *Early Years*, *43*(4–5), 1102–1117. https://doi.org/10.1080/09575146.2022.2059067

Heikka, J., Kahila, S., & Ranta, S. (2025). "Increased PAD time makes me a better early childhood education teacher" – Finnish ECE teachers' perceptions of the significance of planning, assessment, and development reform for implementation of pedagogy. *Journal of Early Childhood Education Research*, *14*(2), 169–194. https://doi.org/10.58955/JECER.148140

Heikka, J., Suhonen, K., & Kahila, S. (2022). Pedagogical Leadership in Early Childhood Education Teachers' Work. *Finnish Early Childhood Education and Care*, 13–26. https://doi.org/10.1007/978-3-030-95512-0_2

Herman, H., Sultan, S., Suardi, S., Wirawan, H., & Lismayani, A. (2025). Redefining early childhood pedagogy: Validating a digital-era competency model for innovation, creativity, and social interaction. *Journal of Pedagogical Research*, *9*(5), 272–289. https://doi.org/10.33902/JPR.202538852

Herman, Sultan, & Suardi. (2025). Early childhood education teachers' perceptions of pedagogical competence 4.0 in supporting early childhood development. *Discover Education*, *4*(348), 1–24. https://link.springer.com/content/pdf/10.1007/s44217-025-00849-0.pdf

Herut, A. H., & Setlhako, M. A. (2025). Shaping future preschool teachers in Ethiopia: A qualitative evaluation of pedagogical competence development mechanisms. *Social Sciences & Humanities Open*, *11*, 101218. https://doi.org/10.1016/J.SSAHO.2024.101218

Hong, Q. N., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M. P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M. C., Vedel, I., & Pluye, P. (2018). The Mixed Methods Appraisal Tool (MMAT), version 2018. Education for Information, 34(4), 285–291. https://doi.org/10.3233/EFI-180221

Izzati, K., & Hayati, N. (2025). Early Childhood Teacher Assessment and Competence: A Systematic Review Analysis. *Al Hikmah Indonesian Journal of Early Childhood Islamic Education*, *9*(2), 416–431. https://doi.org/10.35896/ijecie.v9i2.1170

Jahreie, J. (2021). The ambivalence of assessment — Language assessment of minority-language children in early childhood education and care. *European Early Childhood Education Research Journal*. https://doi.org/10.1080/1350293X.2021.1968459

Kangas, J., Niemi, L., Ranta, S., Paasovaara-Pösö, S., Kahila, S., Korkeaniemi, E., & Harju-Luukkainen, H. (2025). The perceived pedagogical competence of teacher candidates in blended learning programs in Finland. *Journal of Early Childhood Teacher Education*, *46*(4), 634–648. https://doi.org/10.1080/10901027.2025.2455510

Khotimah, N., & Reza, M. (2022). Digital Literacy to Improve Pedagogical and Professional Competence of Early Childhood Teacher. *Jurnal Inovasi Dan Teknologi Pembelajaran*, *9*(2), 117–125. https://doi.org/10.17977/UM031V9I22022P117

Kihwele, J. E., Mwamakula, E. N., &

Mtandi, R. (2025). Portfolio-based assessment feedback and development of pedagogical skills among instructors and pre-service teachers. *Journal of Applied Research in Higher Education*, *17*(5), 1510–1523. https://doi.org/10.1108/JARHE-04-2023-0139

KÜÇÜKOBA, E. (2023). Digital Parenting and Digital Childhood: Raising Gifted Children Born into the Digital Age. *Journal of Interdisciplinary Education: Theory and Practice*. https://doi.org/10.47157/jietp.1178915

Lestari, A., Damayanti, R., & Meilana, S. F. (2025). Early Assessment and Identification of Children with Special Needs to Support Inclusive Education. *Holistic Science*.

Lestari, F. D., Nopiana, N., & Haenilah, E. Y. (2025). The Relationship between Teachers' Pedagogic Competence and the Ability to Carry Out Evaluation using Anecdotal Records in Early Childhood Education Institutions. *Journal of Educational Research, Evaluation and Supervision*, *2*(2), 48–61. https://journal.jannatunnaimlampung.com/index.php/JERES/article/view/7

Margrain, V., Hope, K., & Stover, S. (2022). Pedagogical Documentation and Early Childhood Assessment Through Sociocultural Lens. In *Encyclopedia of Teacher Education*. https://doi.org/10.1007/978-981-13-1179-6_350-1

Matsumoto, H., Nishiu, H., Taniguchi, M., Kataoka, M., & Matsui, G. (2023). Pedagogical photo documentation for play in early childhood education and care. *Early Years*, *43*(4–5), 794–810. https://doi.org/10.1080/09575146.2021.2017407

Milania, A. A., & Murniati, W. (2022a). Teacher's Pedagogic Competence In Evaluating Learning. *KINDERGARTEN: Journal of Islamic Early Childhood Education*, *5*(2), 245–250. https://doi.org/10.24014/KJIECE.V5I2.20013

Nuttall, J., Rooney, T., Gunn, A. C., & White, E. J. (2023). The impact of digital documentation platforms on early childhood educators' work in Australia and New Zealand. *Technology, Pedagogy and Education*, *32*(2), 257–273. https://doi.org/10.1080/1475939X.2023.2177720

Okayanti, N. K., Arifin, I., & Putra, Y. D. (2023). Pengembangan Bahan Ajar Pendidikan dalam Projek Penguatan Profil Pelajar Pancasila di TK Bali Public School Denpasar Bali. *Journal of Instructional and Development Researches*, *3*(3), 101–109. https://doi.org/10.53621/jider.v3i3.234

Oktaria, R., Syarif Sumantri, M., Rahmawati, Y., & Supena, A. (2026). Self-assessment in early childhood pedagogy: A mixed methods study of practices in Indonesia's ECE sector. *Issues in Educational Research*, *36*(1), 2026. https://mpr.go.id/

Oralie McAfee, Deborah J. Leong, E. B. (2016). *Assessing and Guiding Young Children ' s Development and Learning* (6th ed.). Pearson. https://books.google.com/books/about/Assessing_and_Guiding_Young_Children_s_D.html?hl=id&id=kdjBEQAAQBAJ

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews 2021 10:1*, *10*(1), 89-. https://doi.org/10.1186/S13643-021-01626-4

Primanisa, R., Lestari, T., & Yuberti, Y. (2024). Teacher pedagogical competence in the implementation of the independent curriculum in The Pilot State Kindergarten of South OKU District. *Al-Athfaal: Jurnal Ilmiah Pendidikan Anak Usia Dini*, *7*(2), 208–226. https://doi.org/10.24042/AL-ATHFAAL.V7I2.24404

Purnama, S., Ulfah, M., Ramadani, L., Rahmatullah, B., & Ahmad, I. F. (2022). Digital Storytelling Trends in Early Childhood Education in Indonesia: A Systematic Literature Review. *JPUD - Jurnal Pendidikan Usia Dini*. https://doi.org/10.21009/jpud.161.02

Ranta, S., Kangas, J., Harju-Luukkainen, H., Ukkonen-Mikkola, T., Neitola, M., Kinos, J., Sajaniemi, N., & Kuusisto, A. (2023). Teachers' Pedagogical Competence in Finnish Early Childhood Education—A Narrative Literature Review. *Education Sciences 2023, Vol. 13, Page 791*, *13*(8), 791. https://doi.org/10.3390/EDUCSCI13080791

Restiglian, E., Raffaghelli, J. E., Gottardo, M., & Zoroaster, P. (2023). Pedagogical Documentation in the Era of Digital Platforms: Early Childhood Educators' Professionalism in a Dilemma. *Education Policy Analysis Archives*, *31*(137). https://doi.org/10.14507/EPAA.31.7909

Sa'adah, A., Hariyati, N., Mohammad, ;, Haq, S., Khamidi, A., Nursalim, M., & Kunci, K. (2025). The Principal's Strategy in Optimizing Learning Communities for the Pedagogical Competency Development of Kindergarten Teachers. *Edunesia : Jurnal Ilmiah Pendidikan*, *6*(1), 491–509. https://doi.org/10.51276/EDU.V6I1.1129

Su, J., & Yang, W. (2023). Digital competence in early childhood education: A systematic review. *Education and Information Technologies 2023 29:4*, *29*(4), 4885–4933. https://doi.org/10.1007/S10639-023-11972-6

Su, J., & Yang, W. (2024). AI literacy curriculum and its relation to children's perceptions of robots and attitudes towards engineering and science: An intervention study in early childhood education. *Journal of Computer Assisted Learning*, *40*(1), 241–253. https://doi.org/10.1111/JCAL.12867; WEBSITE:WEBSITE:PERICLES;JOURNAL:JOURNAL:13652729;ISSUE:ISSUE:DOI

Susmawati, E., & Sukinah, S. (2025). Enhancing Pedagogical Competence in Inclusive Kindergarten Settings: The Effectiveness of Learning Communities as Professional Development Strategy. *Journal of Innovation and Research in Primary Education*, *4*(4), 2401–2411. https://doi.org/10.56916/JIRPE.V4I4.2297

Suswanti, Y., Arifin, I., & Akbar, S. (2025). Penguatan Kompetensi Pedagogik Guru Melalui Komunitas Belajar; Startegi dan Implementasi. *Prosiding Seminar Nasional Kependidikan Sekolah Dasar Dan Prasekolah*. https://conference.um.ac.id/index.php/ksdp2/article/view/3429

Thanh Huyen, N., Thi Huyen, N., Thi Kim Yen, T., & Quoc Viet, T. (2026). Play and the formation of pedagogical competence: an ethnographic study of early-childhood teacher education in Vietnam. *Ethnography and Education*. https://doi.org/10.1080/17457823.2026.2652882

Tutupary, R., Sahetapy, L. M., & Rumahlewang, E. (2023). The Effect of Pedagogic Competence and Professional Attitude on the Ability to Manage PAUD Authentic Assessments in Ambon City. *Jurnal*

Obsesi : Jurnal Pendidikan Anak Usia Dini, *7*(4), 3963–3980. https://doi.org/10.31004/OBSESI.V7I4.4503

Undheim, M., & Ploog, M. (2024). Digital competence and digital technology: a curriculum analysis of Norwegian early childhood teacher education. *Scandinavian Journal of Educational Research*, *68*(6), 1105–1120. https://doi.org/10.1080/00313831.2023.2204109

UU No. 14 Tahun 2005. (2005). *Undang-undang (UU) Nomor 14 Tahun 2005 tentang Guru dan Dosen*. https://peraturan.bpk.go.id/Details/40266/uu-no-14-tahun-2005

Yafie, E., Anisa, N., Maningtyas, R. D. T., Iriyanto, T., Jumaat, N. F., & Widiasih, R. M. (2024). Enhancing Early Childhood Educator's Digital Competencies through AI-Powered Learning Modules (AI-PEL) Training Program. *Al-Athfal: Jurnal Pendidikan Anak*, *10*(1), 73–82. https://doi.org/10.14421/al-athfal.2024.101-07

Yafie, E., Gonadi, L., Maningtyas, R. T., Haqqi, Y. A., Maulidia, L. N., & Azizah, A. R. (2021). Development of Mobile Assisted Training with Seamless Learning Basis to Improve Parents' Parenting Skill and Overcome Speech Delay for Two-Year-Old Children. *Proceedings of the 1st International Conference on Continuing Education and Technology (ICCOET 2021)*, 122–128. https://doi.org/10.2991/ASSEHR.K.211101.024

Yafie, E., Haqqi, Y. A., Alif, A., & Azizah, A. R. (2025). Development of Mobile Apps NextGen Leadership Program to Improve Managerial Competence and Supervision of Kindergarten Principals. *Jurnal Mutiara Pendidikan*, *5*(1), 37–49. https://doi.org/10.29303/JMP.V5I1.8636

Yafie, E., Haqqi, Y. A., Robbaniyah, I., Nur Maulidia, L., Azizah, A. R., & Astuti, W. (2022). Effectiveness Mobile Peer Support Application to Enhance Teacher Competence: The Moderating Role Teacher Self-Efficacy. *Proceedings - 2022 2nd International Conference on Information Technology and Education, ICIT and E 2022*. https://doi.org/10.1109/ICITE54466.2022.9759861

Yafie, E., Pramono, Sutama, I. W., Samawi, A., Khairuddin, K. F. B., & Asyhari, R. (2024). Development and Validation of a Mobile Application for Early Childhood Nutrition Monitoring: A Multisensor-Based Non-Contact Anthropometric System. *Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini*, *9*(3), 421–433. https://doi.org/10.14421/jga.2024.93-05

Yang, W., Hu, X., Yeter, I. H., Su, J., Yang, Y., & Lee, J. C. K. (2024). Artificial intelligence education for young children: A case study of technology-enhanced embodied learning. *Journal of Computer Assisted Learning*, *40*(2), 465–477. https://doi.org/10.1111/JCAL.12892; PAGEGROUP:STRING:PUBLICATION

Zhou, X. (2024). Sociocultural Theory in Early Childhood Education. *Lecture Notes in Education Psychology and Public Media*. https://doi.org/10.54254/2753-7048/51/20240981