



A Multidimensional Mapping of Early Childhood Teachers' Assessment Literacy and Barriers to Authentic Assessment Implementation: Evidence from Semarang City

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Abstract: This study aims to map the level of assessment literacy among early childhood education (ECE) teachers in Semarang City and to identify the challenges associated with implementing authentic assessment. The study employed a quantitative approach with a descriptive design. The sample consisted of 583 ECE teachers selected through proportionate random sampling. The instrument used was a Likert-scale questionnaire measuring five dimensions: assessment understanding, planning and implementation, recording and data processing, supporting and inhibiting factors, and professional development. The questionnaire was developed based on construct validity procedures and pilot-tested on 30 respondents. Of the initial 31 statement items, 23 were declared valid, with validity coefficients ranging from 0.392 to 0.691. The reliability test produced a Cronbach's Alpha coefficient of 0.871, indicating high reliability. Data were analyzed using descriptive statistics, including percentages and frequency distributions. The findings indicate that teachers' assessment literacy is at a moderate level, with stronger technical competence than conceptual and analytical competence. Teachers still experience difficulties in understanding fundamental assessment concepts, determining developmental indicators, and interpreting assessment results for instructional decision-making. In addition, major challenges arise from structural factors, such as limited time, inadequate facilities, insufficient institutional support, and unequal access to professional development opportunities. This study contributes by providing a multidimensional profile of assessment literacy encompassing conceptual, technical, analytical, structural, and professional aspects. The findings may serve as a foundation for the development of a contextual play-based assessment model.

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Introduction

Assessment in early childhood education (ECE) plays a fundamental role in monitoring children's holistic development while serving as a basis for pedagogical decision-making that is responsive to individual needs. In the evolving paradigm of modern education, assessment is no longer viewed merely as a tool for evaluating learning outcomes, but rather as a formative process integrated into instruction to enhance the quality of children's learning experiences (Black & Wiliam, 2018; Darling-Hammond et al., 2020). In the context of ECE, authentic assessment has become increasingly relevant, as it enables teachers to evaluate children's development through meaningful and contextual activities, particularly through play, which reflects the natural characteristics of children's learning (Mohammed et al., 2026)

In line with these developments, teachers' assessment literacy has emerged as a strategic issue in global education discourse. Assessment literacy is not limited to technical



skills in constructing instruments; rather, it is a multidimensional construct encompassing conceptual understanding, practical skills, and professional dispositions in designing, implementing, interpreting, and utilizing assessment results in a valid and ethical manner (Madigan et al., 2019; Pyle & DeLuca, 2017). Teachers with adequate levels of assessment literacy are more likely to integrate formative assessment into daily teaching practices, allowing assessment to function as an integral part of the learning process rather than merely as an administrative requirement (DeLuca et al., 2021a) (Sato et al., 2018). Conversely, low levels of assessment literacy may lead to procedural, less meaningful assessment practices that fail to contribute optimally to children's development.

Despite its recognition as an essential competency, previous studies indicate that the implementation of assessment literacy remains challenging, particularly in early childhood settings. Teachers often encounter difficulties in conducting systematic observations, documenting children's development, and interpreting assessment data comprehensively (Looney et al., 2018). In addition, structural factors such as heavy administrative workloads and limited time constraints significantly affect the quality of assessment practices in classrooms, resulting in assessments being conducted merely as formalities without meaningful impact on learning (Black & Wiliam, 2019). In Indonesia, the implementation of the Merdeka Curriculum has shifted the educational paradigm toward student-centered and developmentally appropriate learning, including in Early Childhood Education (ECE). This policy emphasizes authentic assessment, formative assessment, and holistic monitoring of children's development rather than merely focusing on academic outcomes. Consequently, ECE teachers are required to possess higher levels of assessment literacy to design meaningful assessments, interpret developmental data accurately, and use assessment results to support individualized learning processes. In addition, the latest national standards for ECE increasingly emphasize child-centered learning, play-based approaches, and continuous developmental assessment. However, many teachers still experience difficulties in understanding assessment principles and implementing authentic assessment practices effectively. Therefore, investigating the level of assessment literacy among ECE teachers in Semarang City becomes highly relevant and urgent in the context of current educational transformation in Indonesia. These conditions highlight a gap between policy expectations that emphasize authentic assessment and meaningful learning and the actual capacity of teachers in practice.

More specifically, the emergence of play-based assessment further reinforces the urgency of strengthening teachers' assessment literacy. This approach enables teachers to observe children's cognitive, language, socio-emotional, and motor development naturally within play contexts. Recent studies suggest that play-based assessment has strong potential for validity and reliability when systematically designed and supported by teachers' competencies (Rumpoko & Diana, 2022). However, its implementation relies heavily on teachers' abilities to conduct accurate observations, maintain systematic documentation, and interpret children's behaviors appropriately. Without sufficient assessment literacy, play-based assessment risks becoming unstructured and lacking scientific accountability.

Although the literature on assessment literacy and authentic assessment has expanded significantly over the past decade, several important research gaps remain. Most studies tend to focus on conceptual development or general interventions to enhance assessment literacy, often within primary and secondary education contexts, thus failing to fully capture the complexity of assessment practices in ECE, which are based on observation and interaction (DeLuca et al., 2021a; Yan & Pastore, 2022)). Meanwhile, research on play-based assessment has largely emphasized instrument development and validation, with limited attention to



teachers' readiness as the primary implementers (Adie et al., 2024). Furthermore, studies that simultaneously examine teachers' assessment literacy and the challenges of implementing authentic assessment within an integrated analytical framework remain scarce, resulting in a lack of comprehensive understanding of the relationship between teacher competence and practical challenges (Hull & Vigh, 2026).

This gap becomes increasingly significant in the Indonesian context, particularly at the regional level, where empirical studies on ECE teachers' assessment literacy remain limited. The literature emphasizes that assessment literacy is context-dependent and influenced by social, cultural, and local policy factors (DeLuca et al., 2021b). The absence of comprehensive empirical data may hinder evidence-based policymaking and the development of contextually relevant assessment models. Semarang City, as a region experiencing rapid educational development, faces challenges in enhancing ECE teacher professionalism, including in the area of assessment practices. However, to date, there has been no comprehensive empirical mapping of teachers' assessment literacy levels and the challenges they encounter in implementing authentic assessment.

The selection of Semarang City as the research site was based on its strategic position as one of the largest urban educational centers in Central Java, characterized by a high density of ECE institutions and heterogeneous teacher backgrounds. These characteristics make Semarang a relevant context for investigating assessment literacy issues within urban ECE settings, particularly amid ongoing educational reforms emphasizing authentic and holistic assessment practices. Moreover, the diversity of institutional conditions and teacher professional capacities in Semarang reflects broader challenges experienced by ECE educators in many urban regions of Indonesia.

Based on these conditions, this study offers a novel contribution by integrating the analysis of teachers' assessment literacy and the challenges of authentic assessment implementation within a comprehensive, locally grounded framework. This study not only maps assessment literacy levels but also identifies practical challenges faced by teachers, thereby providing a more holistic and applicable understanding. Furthermore, this research is designed as a diagnostic (baseline) study to serve as a foundation for developing a contextual play-based assessment model tailored to the characteristics of ECE in Indonesia. Therefore, this study is expected to contribute both theoretically to the development of assessment literacy research and practically to improving the quality of assessment and learning in early childhood education. Accordingly, this study aims to map the level of assessment literacy among ECE teachers in Semarang City, identify challenges in implementing authentic assessment, and formulate a conceptual foundation for developing a play-based assessment model.

Research Method

This study employed a quantitative approach with a descriptive design aimed at systematically and factually mapping the level of assessment literacy among early childhood education (ECE) teachers and identifying challenges in the implementation of authentic assessment in practice. A descriptive design was selected because the study does not focus on examining relationships between variables but rather on describing the actual conditions within the research population (Creswell, 2018; Fraenkel et al., 2019). This approach is appropriate as a preliminary (baseline) study to provide empirical data that will serve as the foundation for developing a play-based assessment model in subsequent research stages.

The population of this study consisted of all ECE teachers in Semarang City, distributed across various districts and types of educational institutions, including



kindergartens, playgroups, and other early childhood education units. The sample was determined using proportionate random sampling to ensure proportional representation across districts and types of ECE institutions. This technique involved determining the number of samples in each stratum (district and type of institution) based on the proportion of teachers in the population, followed by random selection of respondents within each stratum. Thus, the selected sample was expected to represent the population characteristics more accurately and reduce sampling bias (Louis Cohen, 2018).

The sample size was determined using the Slovin formula with a 5% margin of error, resulting in a total of 583 respondents. The proportionate random sampling technique was then applied to distribute the sample proportionally based on the number of kindergarten and playgroup teachers in each district. The research instrument was a literacy assessment questionnaire developed based on recent theoretical frameworks. The construct of assessment literacy in this study consisted of five main dimensions: (1) understanding of assessment concepts and principles; (2) ability to design assessment instruments; (3) skills in observation and documentation of children's development; (4) ability to interpret assessment results; and (5) utilization of assessment results for instructional planning. The instrument was designed using a Likert scale with multiple response options to quantitatively measure teachers' levels of understanding and skills. In addition, open-ended questions were included to explore teachers' perceptions of the challenges in implementing authentic assessment in classroom practice.

To ensure the quality of the instrument, the questionnaire was developed based on construct validity procedures and was pilot-tested on 30 respondents. From the initial 31 statement items, 23 items were declared valid, with validity coefficients ranging from 0.392 to 0.691. The reliability test showed a Cronbach's Alpha coefficient of 0.871; content validity was established through expert judgment involving specialists in early childhood education and educational assessment. This process aimed to ensure the alignment of items with the measured constructs, clarity of wording, and contextual relevance to field practices. Furthermore, a limited pilot test was conducted to examine readability and item consistency, as well as to obtain preliminary information regarding the reliability of the instrument before the main data collection.

Data were collected through the distribution of questionnaires to ECE teachers in Semarang City, both online and offline, depending on respondents' accessibility and conditions. The data collection process adhered to ethical research principles, including informing participants about the purpose of the study and ensuring the confidentiality of their responses. The collected data were analyzed using descriptive statistical techniques, including mean scores, percentages, and frequency distributions to describe the level of teachers' assessment literacy. Additionally, the levels of assessment literacy were categorized into several groups (e.g., high, moderate, and low) based on specific score ranges. This analysis aimed to provide a comprehensive mapping of ECE teachers' assessment literacy profiles. Meanwhile, data obtained from open-ended questions were analyzed descriptively by grouping responses into thematic categories representing various challenges in implementing authentic assessment. These challenges were further classified into pedagogical, technical, and structural aspects to provide a more systematic understanding of the issues faced by teachers in practice.

Results and Discussion

Based on the data collection conducted to map the level of assessment literacy among early childhood education (ECE) teachers in Semarang City and to identify the challenges in implementing authentic assessment, the findings are presented in the following table.

Table 1. Recapitulation Table of Early Childhood Education (ECE) Teachers' Assessment Literacy Based on Dimensions and Indicators.

No	Dimension	Indicator (Question Item)	Dominant Category	Percentage (%)	Description
1	Assessment Understanding	Understanding assessment concepts	Disagree	49.7	Conceptual understanding is still low
		Understanding assessment purposes	Agree	58.2	Teachers understand the function of assessment
		Understanding assessment techniques	Agree	69.0	Technical competence is relatively strong
		Distinguishing formative and summative assessment	Neutral	47.8	Confusion in assessment classification
2	Planning & Implementation	Difficulty in designing assessment instruments	High Difficulty	49.7	Difficulty in instrument development
		Availability of assessment guidelines	Agree	74.1	Guidelines are available but not optimally used
		Difficulty in determining indicators	High Difficulty	68.9	Most dominant issue
		Understanding assessment rubrics	Disagree	42.3	Limited understanding of rubrics
		Difficulty in applying assessment techniques	High Difficulty	42.0	Challenges in implementation
		Difficulty in developing innovative assessment	High Difficulty	57.2	Lack of innovation in assessment practices
3	Recording & Processing	Difficulty in processing observation data	High Difficulty	57.3	Weak data processing skills
		Time required for recording	High Difficulty	57.1	Time constraint is a major issue
		Difficulty in interpreting results	High Difficulty	58.9	Weak analytical ability
		Using data for instructional decisions	High Difficulty	57.3	Not optimally utilized

		Preparing developmental reports	High Difficulty	57.2	Difficulty in narrative reporting
		General assessment difficulties	High Difficulty	61.8	Highest level of difficulty
4	Supporting & Inhibiting Factors	Availability of assessment facilities	High Difficulty	55.0	Facilities are not evenly available
		Limited facilities hinder assessment	Agree	58.0	Facilities are a significant barrier
		Principal support	Neutral	50.0	Support is not optimal
		Staff support	Neutral	48.0	Collaboration is limited
		Sufficiency of time for assessment	Disagree	52.0	Time is insufficient
		Difficulty in time management	High Difficulty	57.0	Time management is a major constraint
5	Training & Professional Development	Participation in assessment training	Neutral	50.0	Participation is uneven
		Benefits of training	Neutral	48.0	Impact of training is not optimal
		Difficulty accessing learning resources	Agree	55.0	Limited access to resources
		Peer discussion on assessment	Neutral	50.0	Collaboration is inconsistent
		Need for additional training	Agree	70.0	High demand for further training
		Need for practical assessment guidelines	Agree	72.0	Teachers need practical guidance

Based on the table, the findings provide an overview of early childhood education (ECE) teachers' assessment literacy according to the measured dimensions, as follows:

1) Teachers' Understanding of Assessment in Early Childhood Education

The findings in the assessment understanding dimension reveal an imbalance between teachers' technical competence and their conceptual understanding of assessment practices. A relatively high proportion of teachers demonstrated understanding of assessment techniques (69%) and recognized the general purposes of assessment in learning processes (58.2%). These findings indicate that ECE teachers are generally familiar with practical assessment procedures used in classroom activities. However, nearly half of the respondents still showed limited understanding of fundamental assessment concepts (49.7%) and uncertainty in distinguishing formative and summative assessment. This pattern suggests that teachers' understanding of assessment remains more procedural than conceptual in nature.

These findings imply that assessment practices in ECE settings are still largely oriented toward technical and administrative completion rather than functioning as reflective processes that support children's holistic development. Difficulties in distinguishing formative and summative assessment may affect teachers' ability to use assessment results meaningfully to improve instructional practices. Within the context of the Merdeka Curriculum and deep learning-oriented educational reforms, this condition becomes particularly significant because teachers are increasingly expected to implement assessment

as a continuous and child-centered process rather than merely documenting learning outcomes.

2) Planning and Implementation of Assessment

In the planning and implementation dimension, the findings indicate that teachers continue to experience substantial difficulties in translating assessment concepts into authentic classroom practices. The most dominant challenge was determining developmental indicators, with 68.9% of teachers reporting high levels of difficulty. Teachers also encountered challenges in developing innovative assessments (57.2%) and designing assessment instruments that appropriately reflect children's developmental characteristics. These findings suggest that although teachers recognize the importance of assessment, their ability to construct contextualized and developmentally appropriate assessment tools remains limited. On the other hand, the relatively high availability of assessment guidelines (74.1%) indicates that the primary issue is not the absence of policies or technical guidance, but rather teachers' capacity to implement such guidelines effectively in classroom settings. Limited understanding of assessment rubrics and difficulties in applying assessment techniques further demonstrate that assessment practices remain largely conventional and insufficiently aligned with authentic learning approaches. This condition reflects a gap between assessment policies promoted by educational reforms and teachers' practical competencies in implementing meaningful assessment processes in ECE classrooms.

3) Recording and Processing of Assessment Results

The findings in the recording and data processing dimension demonstrate that teachers still face major challenges in managing assessment information systematically and meaningfully. The highest level of difficulty was found in interpreting assessment results (58.9%), followed by difficulties in processing observational data and using assessment results for instructional decision-making (both 57.3%). These findings suggest that assessment activities conducted by teachers have not yet fully functioned as reflective processes to support instructional planning and individualized learning for children. Furthermore, the high level of difficulty associated with recording developmental progress and preparing narrative reports indicates that assessment documentation is still perceived as a time-consuming administrative burden. Teachers appear to struggle in transforming observational data into meaningful developmental information that can guide classroom instruction effectively. As a result, assessment practices may remain limited to documentation activities without producing significant impacts on learning quality. Therefore, more practical assessment recording systems and targeted professional support are needed to strengthen teachers' analytical skills in interpreting children's developmental data.

4) Supporting and Inhibiting Factors in Assessment Implementation

The findings related to supporting and inhibiting factors demonstrate that structural and organizational conditions remain major barriers to effective assessment implementation in ECE settings. Approximately 58% of teachers reported that limited facilities hinder assessment implementation, while 57% experienced difficulties in managing time for assessment activities. In addition, more than half of the respondents (52%) stated that the available time for conducting assessments was insufficient. These findings indicate that authentic assessment practices require adequate institutional support, resources, and time management to be implemented effectively and sustainably. At the same time, support from principals and colleagues remained at a moderate level, suggesting that collaborative assessment cultures within schools have not yet been strongly established. This finding indicates that assessment literacy is influenced not only by individual teacher competence but also by organizational and institutional support systems. Limited professional collaboration

may reduce opportunities for teachers to discuss, reflect upon, and improve their assessment practices collectively. Therefore, strengthening collaborative school cultures and managerial support is essential for improving the overall quality of assessment literacy among ECE teachers.

5) Training and Professional Development in Assessment

The findings in the training and professional development dimension reveal a very strong need for more sustainable and practice-oriented professional support related to assessment. The highest demand was found in the need for practical assessment guidelines (72%), followed closely by the need for additional assessment training (70%). These results indicate that teachers still feel insufficiently prepared to implement authentic assessment practices effectively. Teachers require not only theoretical understanding but also concrete examples and practical strategies that can be directly applied in daily classroom contexts. Although some teachers had participated in assessment-related training, the perceived benefits of such programs remained limited. Participation in peer discussions regarding assessment practices also remained moderate, suggesting that professional learning communities among ECE teachers have not yet developed consistently. In addition, limited access to learning resources (55%) further highlights the need for more equitable and accessible professional development systems. These findings suggest that improving assessment literacy cannot rely solely on short-term training programs, but instead requires continuous professional support, collaborative learning opportunities, and practical resources that are relevant to teachers' everyday assessment practices. Overall, the findings in this dimension indicate that the professional development system for ECE teachers, particularly in the area of assessment, is not yet comprehensive or sustainable. Although training initiatives exist, uneven participation, limited impact, and restricted access to learning resources remain key challenges. On the other hand, the high demand for additional training and practical guidelines highlights a significant opportunity to develop a more contextual, systematic, and sustainable model for enhancing teachers' assessment literacy.

Discussion

The findings of this study indicate that the level of assessment literacy among early childhood education (ECE) teachers in Semarang City falls within the moderate category, characterized by a gap between conceptual understanding and practical implementation in assessment practices. This finding reinforces the view that assessment literacy is a multidimensional construct encompassing not only knowledge of assessment but also skills, dispositions, and reflective capacity in using assessment as a tool to improve the quality of learning (Popham, 2014; Pyle & DeLuca, 2017).

In the context of early childhood education, assessment literacy plays a more complex role compared to other educational levels, as assessment is not solely used to measure academic achievement but also to document children's holistic development authentically. Therefore, inadequate or suboptimal assessment literacy among teachers may directly affect both the quality of learning and the monitoring of children's development (Kainulainen & Tarnanen, 2026).

The Conceptual-Practical Gap as a Core Issue in Assessment Literacy

The findings reveal that teachers demonstrate relatively strong technical skills in assessment but remain weak in conceptual understanding, particularly in comprehending the meaning of assessment and distinguishing between formative and summative assessment. This phenomenon reflects a condition of fragmented assessment literacy, in which teachers' knowledge is not fully integrated. This finding aligns with Stobart Susantini et al. (2025), who argues that assessment practices lacking strong conceptual understanding tend to be

mechanistic and procedure-oriented rather than learning-oriented. In such conditions, teachers tend to “conduct assessment” without fully understanding “why assessment is conducted.”

Furthermore, Lally et al. (2025) emphasize that effective assessment should function as an integral part of the learning process (assessment for learning), providing continuous information about learners’ development. In this context, weak conceptual understanding leads to the loss of the formative function of assessment, reducing it to an administrative task. The findings also suggest that most ECE teachers in this study are at the level of functional assessment literacy, meaning they are able to apply assessment techniques but lack the ability to interpret and use them reflectively. According to Brookhart (2011), comprehensive assessment literacy should include reflective capacity and data-informed decision-making, which remain underdeveloped in this study.

The Complexity of Assessment Planning in Early Childhood Education

Teachers’ difficulties in determining developmental indicators and designing assessment instruments indicate challenges in assessment design competence. In the context of ECE, assessment design is inherently complex, as it must consider the dynamic, contextual, and play-based nature of children’s development. These findings are consistent with DeLuca and Bellara (Hadyaoui & Cheniti-Belcadhi, 2023), who highlight that one of the main challenges faced by teachers is achieving alignment between curriculum, learning indicators, and assessment (constructive alignment). Misalignment leads to assessment practices that fail to accurately represent children’s developmental outcomes.

Moreover, difficulties in determining indicators reflect teachers’ limited ability to translate learning outcomes into observable and measurable indicators. This is supported by Xu & Brown (2016), who note that teachers often struggle to operationalize curriculum standards into concrete assessment practices. The observed dependence on guidelines suggests a condition of procedural dependency, where teachers rely heavily on prescribed frameworks without sufficient adaptive capacity. In the long term, this may hinder teachers’ creativity and innovation in developing contextually relevant assessment practices.

Limited Analytical Capacity in Processing Assessment Data

One of the most critical findings of this study is the high level of difficulty teachers experience in interpreting and analyzing assessment results. This indicates that teachers’ assessment literacy has not yet reached the stage of data-informed decision making. According to Rakhmayani (2023), the core of formative assessment lies in teachers’ ability to use assessment information to adjust instructional strategies. However, in this study, teachers still struggle to transform data into pedagogical decisions, resulting in assessments not functioning optimally as a tool for improving learning (Baier-Mosch et al., 2024). also emphasizes that data analysis skills are a fundamental component of assessment literacy. Without these skills, assessment remains limited to data collection rather than data utilization. Additionally, teachers’ difficulties in preparing developmental reports suggest a limited understanding of authentic assessment principles in ECE. In authentic assessment, developmental reports should be descriptive, reflective, and evidence-based. Weaknesses in this area indicate that teachers require further support in assessment communication skills.

Structural Dimensions as Determinants of Assessment Literacy

The findings strongly indicate that assessment literacy is influenced not only by individual competencies but also by structural factors such as time constraints, availability of resources, and institutional support. This supports the view of Pastore and Andrade (2019), who argue that assessment literacy is shaped by the interaction between individuals and their context. Time constraints represent a major barrier to effective assessment practices. This



aligns with Looney et al. (2018), who note that teachers' workload often limits the implementation of authentic assessment, which requires continuous observation and documentation.

Furthermore, limited facilities indicate disparities in educational support systems. Christie & Lingard (2020) emphasize that effective teaching and assessment practices depend heavily on supportive learning environments, including adequate resources and policies. The lack of support from school leaders and educational staff also suggests that assessment has not yet become an integrated school culture. From the perspective of a professional learning community, collaboration among teachers and strong leadership support are essential for improving teaching quality (Darling-Hammond et al., 2020).

Gaps in Teacher Professional Development Systems

The dimension of training and professional development indicates that current systems for developing teachers' assessment competencies remain suboptimal. Uneven participation, limited training impact, and restricted access to learning resources point to a professional development gap. According to Kainulainen & Tarnanen (2026), the development of assessment literacy requires sustained professional learning that integrates theory and practice within relevant contexts. One-time training (one-shot training) is insufficient to significantly improve teachers' competencies. Moreover, Susantini et al. (2025) emphasize that effective professional development should be practice-based, collaborative, and contextually relevant. In this study, the high demand for additional training and practical guidelines indicates that teachers require more applied and context-sensitive professional learning approaches. These findings also suggest that teachers need not only theoretical knowledge but also practical support in the form of tools, strategies, and assessment models that can be directly implemented in classroom practice.

Conclusion

This study concludes that the level of assessment literacy among early childhood education (ECE) teachers in Semarang City is at a moderate level, characterized by a gap between technical proficiency and weaknesses in conceptual and analytical aspects. While teachers are generally able to apply assessment techniques, they still face difficulties in understanding fundamental concepts, designing indicators, and interpreting assessment results for instructional decision-making. In addition, structural factors such as limited time, insufficient facilities, and inadequate institutional support, as well as suboptimal professional development, significantly influence assessment practices. This study contributes by proposing a multidimensional profile of assessment literacy that encompasses conceptual, technical, analytical, structural, and professional aspects. The findings highlight the importance of strengthening teachers' competencies holistically and providing sustained systemic support to ensure that assessment functions effectively in improving the quality of early childhood learning.

Recommendation

The findings of this study suggest the need for stronger policy and institutional support to improve assessment literacy among Early Childhood Education (ECE) teachers in Semarang City. At the regional policy level, the Semarang City Education Office is expected to develop sustainable professional development programs focusing on authentic assessment, developmental indicator formulation, data interpretation, and play-based assessment practices aligned with the Merdeka Curriculum and deep learning-oriented educational policies. In addition, the Education Office should strengthen mentoring systems, provide practical



assessment guidelines and accessible learning resources, and simplify administrative demands related to assessment activities. Such efforts are important to support teachers in implementing meaningful and developmentally appropriate assessment practices more effectively.

At the institutional level, ECE principals are encouraged to strengthen collaborative and supportive school cultures related to assessment implementation. School leaders should facilitate reflective supervision, peer mentoring, professional discussions, and collaborative lesson planning activities that enable teachers to improve their assessment competencies continuously. Principals also need to ensure adequate facilities, allocate sufficient time for assessment activities, and create organizational conditions that support systematic observation, developmental recording, and data-based instructional decision-making. Meanwhile, teachers are encouraged to actively participate in professional learning communities, improve their conceptual and technical understanding of assessment, and develop more innovative and contextualized assessment strategies that are responsive to children's developmental characteristics and learning needs.

For future researchers, further studies are recommended to develop intervention-based models for improving assessment literacy among ECE teachers, particularly through mentoring programs, collaborative professional development, and technology-supported assessment systems. Future research may also employ mixed-method or longitudinal approaches to examine the long-term development of assessment literacy and its influence on instructional quality in ECE settings. In addition, comparative studies across different educational contexts and regions in Indonesia are important to provide broader insights into the structural, professional, and sociocultural factors influencing authentic assessment implementation in early childhood education.

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