

Challenges and Development Paths for Teachers' Assessment Literacy in Game-Based Learning

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Abstract: This study, based on international academic research on assessment literacy in project-based learning (PBL) and in light of Chinese preschool education practices, analyzes the challenges faced by teachers' assessment literacy in PBL, including the contradiction between assessment and game integration, the pressure of data processing, cultural context conflicts, and the tension between standardized assessment and game-based teaching. The study suggests that teachers' assessment literacy can be enhanced and children's all-round development promoted by constructing a "game-assessment" integration theoretical framework, strengthening professional support systems, and promoting home-kindergarten collaboration.

Keywords: Game-based learning; Teachers' assessment literacy; Assessment challenges; Development paths

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1. Core arguments on teachers' assessment literacy in PBL from an international perspective

1.1. Conceptual conflict: The dilemma of dual opposition between games and assessment

International research consistently indicates that project-based learning (PBL) demands a paradigm shift in teachers' assessment concepts, transitioning from skill quantification to literacy development. Traditional assessment focuses on standardized measurement of discrete skills such as literacy and mathematics, whereas in PBL contexts, teachers need the ability to assess children's comprehensive literacy, including cognitive construction, social interaction, and symbolic representation. Studies have found that over half of teachers still employ exit assessments, extracting children from games for individual testing, reflecting an assessment concept that fails to adapt to the essence of PBL, where "learning is a gaming experience." This conceptual conflict essentially represents a lack of "developmental assessment awareness" among teachers, making it difficult for them to understand the assessment value of implicit learning in games.

1.2. Practical challenges: Multidimensional findings from international empirical research

1.2.1. Lag and limitations in teachers' assessment dimensions

International research consistently shows that assessment content in game-based learning has shifted from traditional academic skills to multiple dimensions such as cognition, socio-emotional development, and executive functions, yet teachers' assessment abilities significantly lag behind. In mature game assessments, teachers need to simultaneously focus on children's symbolic representation abilities, social role coordination, and self-regulation, but over half of teachers still focus solely on the single dimension of "whether game tasks are completed" ^[1]. From a semiotic theory perspective, this assessment gap essentially represents a lack of semiotic mediation ability.

1.2.2. Dilemmas and contradictions in teachers' assessment methods

International empirical research reveals that PBL imposes special requirements for the contextual sensitivity of assessment methods, but teachers face multiple obstacles in method selection and integration. Traditional standardized tests have extremely low validity in game contexts, while recommended methods such as anecdotal records and video analysis are difficult to implement effectively due to issues such as large data volumes and subjective biases ^[2]. Although teachers recognize the value of games for students' social development, they tend to prioritize academic learning assessment, further exacerbating the disconnect between practice and concept.

1.2.3. Application and challenges of teachers' assessment tools

Kindergarten teachers also report challenges in game-based learning, including uncertainty about how to implement teacher-guided games and a lack of resources and training for learning through games ^[3]. In teaching environments, large class sizes and fixed class hours make it difficult to meet the time demands of game assessment. Additionally, significant cultural background differences, such as the contradiction between policy promotion and insufficient teacher training in Bangladesh, highlight the complexity of adapting assessment tools to diverse educational contexts. These challenges urgently require systematic solutions to enhance teachers' assessment literacy.

1.3. Development paths: Three major shifts in reconstructing assessment literacy

1.3.1. Paradigm reconstruction: Innovating assessment concepts from outcomes to support

Teachers need to abandon their reliance on standardized tests and establish an assessment paradigm dynamically embedded in the game process. DeLuca *et al.* proposed the Assessment Innovation Cycle Theory, advocating for the deep integration of assessment goals with game contexts ^[4]. Before the game, goals are negotiated to focus assessment on specific ability dimensions; during the game, minimal intervention is implemented, with open-ended questions used to stimulate children's metacognition; after the game, multimodal evidence is integrated, combining children's drawing logs, game videos, and teacher anecdotal records to form process-oriented portfolios.

1.3.2. Technology empowerment: Innovating assessment tools for constructing dynamic evidence

The adaptation of technological tools to assessment frameworks is key to breaking through traditional assessment limitations. Research has validated three innovative paths: First, portable devices assist in

dynamic capture, such as using iPads to film game segments for reviewing learning moments. South African teachers use mobile phones to record block games and match them with a simplified version of the MPOT scale, significantly improving the validity of spatial skill assessment^[4]; Second, the development of quantitative tools for cognitive development, with a Hong Kong research team integrating five levels of structure into a three-level maturity model based on the SOLO taxonomy and quantifying children's cognitive levels in symbolic games; Third, the localization transformation of cross-cultural tools, with an African project simplifying mature game observation indicators to enable teachers in resource-limited areas to identify key learning nodes in games^[5].

1.3.3. Ecological co-construction: Building collaborative mechanisms for assessment communities

The development of assessment literacy relies on an ecosystem of policy, culture, and professional collaboration. Nordic experience shows that policy institutional guarantees are fundamental, such as Sweden incorporating game assessment into teacher qualification certification systems and alleviating academic pressure through social pedagogy traditions; Canada reduces assessment subjectivity through teacher learning community mechanisms, organizing teachers to jointly analyze game video segments. In terms of home-school collaboration, the UK's "Play Stories" project uses photos and children's explanations to visually interpret learning evidence for parents.

2. Analysis of similarities and differences in main viewpoints and survey results from an international perspective

2.1. Integration challenges of games and assessment

2.1.1. Similarities

Both emphasize the challenges teachers face in integrating PBL with assessment. Pyle and DeLuca pointed out that although games have obvious benefits for children's overall development, assessment is still dominated by traditional standardized testing methods, making it difficult for teachers to conduct academic and multidimensional assessments simultaneously in games^[5]. Bubikova-Moan *et al.* also mentioned that teachers often feel confused due to the lack of clear frameworks and standards for game assessment, especially in different educational contexts, where it is difficult for them to balance the fun of games with the demands of academic assessment^[6].

2.1.2. Differences

While both acknowledge the challenges of integrating games and assessment, they propose different solutions. Pyle and DeLuca emphasize informal assessment methods, such as observational records and anecdotal records, to help teachers assess students' comprehensive development without standardized tests^[5]. Bubikova-Moan *et al.* focus on how to adjust assessment methods in different cultural and educational contexts, pointing out that teachers need to adjust the combination of games and assessment according to local needs, thus proposing different coping strategies^[6].

2.2. Teachers' roles in PBL

2.2.1. Similarities

The diversity of teachers' roles in PBL is widely recognized. Pyle and DeLuca pointed out that teachers in

PBL are both facilitators and participants, needing to support students' free exploration while ensuring the achievement of academic goals ^[5]. Bubikova-Moan *et al.* mentioned that teachers should adjust their roles according to the type of game, maintaining minimal intervention in free games and playing a more active role in guided games ^[6].

2.2.2. Differences

Although teachers play multiple roles in PBL, their specific focuses differ. Pyle and DeLuca pay more attention to how teachers can flexibly adjust their roles in games, both guiding students and avoiding excessive intervention ^[5]. Bubikova-Moan *et al.* focus on the impact of different educational cultures on teachers' roles, pointing out that in some educational systems, teachers may excessively intervene in students' games, limiting students' autonomy, while in other systems, teachers may be overly laissez-faire ^[6].

2.3. Application of assessment methods and tools

2.3.1. Similarities

The selection and use of assessment tools are crucial for the success of PBL. Pyle and DeLuca mentioned that traditional assessment tools, such as standardized tests and rating scales, cannot effectively assess learning through games, while informal assessment methods (such as observational records) are particularly important in this process ^[5]. Bubikova-Moan *et al.* also mentioned that the assessment methods used by teachers are often informal, but the lack of standardization makes the reliability and comparability of assessment results questionable ^[6].

2.3.2. Differences

Different practical and innovative solutions are proposed regarding the selection of specific assessment tools. Pyle and DeLuca tend to emphasize how teachers can compensate for the shortcomings of traditional assessment tools through informal assessment methods, believing that these methods can better capture students' performance in games ^[5]. Bubikova-Moan *et al.* explore how to adjust assessment methods in different cultural contexts, pointing out that in areas with significant cultural differences, teachers may need to adjust assessment strategies to meet the needs of different students ^[6].

3. Theoretical analysis and personal viewpoints on teacher assessment literacy in kindergarten teaching

3.1. Theoretical perspectives on games in kindergarten teaching

3.1.1. Symbolic development theory: Cognitive foundations for evaluating content transformation

The triadic theory of signs and symbolic development theory reveal that game assessment should shift from "skill quantification" to analyzing children's symbolic transformation abilities. The international consensus on transitioning assessment content towards holistic competencies essentially focuses on children's symbolic mediation capabilities. This commonality stems from cross-cultural cognitive patterns in symbolic representation, where children, regardless of whether they are from Europe, America, or Asia, follow a developmental trajectory from concrete to abstract symbol use. Symbolic interaction theory offers new perspectives and insights for research on teacher professional development. The technological innovations in

assessment tools in developed countries and the prioritized understanding of symbolic assessment concepts in developing countries reflect a dichotomy between “tool innovation” and “cultural adaptation” in the application of symbolic theory.

3.1.2. Theory of mind: Psychological mechanisms underlying assessment method dilemmas

The theory of mind suggests that game assessment should focus on children’s social cognition and self-regulation abilities, explaining why international research consistently finds traditional assessment methods inadequate for capturing mental activities during gameplay. The global demand for diversified assessment methods essentially mirrors the theory of mind’s proposition that “language is an external carrier of the mind.” Given the importance and uniqueness of various human abilities, the task of educators becomes increasingly complex. Educators must explore the generative patterns of different abilities and promote individual development accordingly. Developed countries leverage mental tools to develop digital assessments, while developing countries, due to teachers’ limited theoretical understanding, focus more on basic training, reflecting differences in “technological empowerment” versus “theoretical foundation-building” in the application of the theory of mind.

3.1.3. Teacher scaffolding theory: Interactive logic for assessment model transformation

Teacher scaffolding theory elucidates the shared value of professional training and practical reflection in international research. Teachers guide children’s thinking through questioning during games, making this interactive mode a core pathway for developing assessment literacy. Developed countries integrate scaffolding with technology, while developing countries adopt localized strategies, such as the “peer scaffolding” model, reflecting differences in “technological integration” versus “cultural adaptation” within scaffolding theory.

3.1.4. Sociocultural theory: The social foundations of assessment literacy development

The core of sociocultural theory lies in the assertion that cognitive development is rooted in specific social and cultural practices. This implies that teachers’ assessment literacy does not exist in isolation but is deeply embedded in and shaped by complex local cultural contexts ^[7]. Facing the challenge of large class sizes in Uganda, teachers have developed adaptive strategies focused on observing group “participation.” In contrast, Colombian teachers, with greater curriculum autonomy, leverage community resources for in-depth assessments ^[8]. Assessment literacy must develop within a culturally adaptive framework, requiring teachers to continuously navigate tensions between localized practical wisdom in real-world settings.

3.2. Personal viewpoints on teacher assessment literacy in PBL

In terms of assessment literacy awareness, Yu pointed out that some kindergarten teachers in China lack strong assessment awareness, pay insufficient attention to process-oriented evaluation, and fail to fully leverage their role in promoting both teacher growth and children’s development ^[9]. They do not integrate evaluation into educational and teaching activities in practice. With the continuous development of educational technology, teachers should not rely solely on existing assessment methods and tools but should possess an innovative spirit to explore suitable assessment approaches based on actual teaching contexts and children’s characteristics.

Regarding assessment literacy knowledge, Gao suggested that teachers lack professionalism in observing

and assessing young children, with weak data collection and analysis skills, making it difficult to objectively and fairly analyze and judge children's developmental status. Consequently, conclusions drawn from observations and assessments of young children may lack reliability and fairness^[10], failing to fully reflect teachers' professionalism and leading roles as evaluators. Process-oriented evaluation of young children's learning should not measure learning outcomes using a single standard but should focus on individual children.

In terms of assessment literacy attitudes and emotions, Li noted that assessment is time-consuming and labor-intensive, increasing teachers' burdens^[11]. In PBL contexts, assessment may become even more complex and challenging, potentially causing teachers to experience stress and confusion. Kindergartens and educational authorities should pay attention to teachers' emotional needs, providing necessary psychological support to enable teachers to engage in assessment work with positive emotions, thereby improving the accuracy and effectiveness of assessments.

Given the numerous deficiencies and issues in teachers' assessment literacy during game-based learning at the awareness, knowledge, and attitudinal-emotional levels, these shortcomings severely impact the quality and effectiveness of kindergarten teachers' assessments. Consequently, they restrict the development of teachers' assessment literacy and the quality of early childhood education. Therefore, enhancing teachers' assessment literacy is crucial for promoting the healthy development of PBL in kindergartens.

4. Conclusion

This study, through international literature analysis, reveals that the core challenges in teachers' assessment literacy during game-based learning in kindergartens stem from triple contradictions involving "assessment philosophy-practice-culture." International experiences indicate that integrating assessment with games should prioritize formative assessment, focusing on children's holistic development. Chinese practice requires balancing academic orientation with the value of games, enhancing teachers' ability to view games as "assessment arenas" through localized tool development, parent education, and professional support systems. Future research could further explore the application of digital assessment tools in PBL, providing technological support for the development of teachers' assessment literacy.

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