

STRENGTHENING EARLY CHILDHOOD EDUCATION THROUGH EFFECTIVE CLASSROOM OBSERVATION AND THE DEVELOPMENT OF HIGHER ORDER THINKING SKILLS

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Abstract

Early childhood education is evolving toward approaches that place children at the center of learning, encourage inquiry, and build cognitive flexibility. As expectations rise, teachers need tools that help them understand how children think and how instruction can be improved in real time. This paper examines how effective classroom observation, paired with intentional strategies for developing higher order thinking skills, can strengthen learning experiences in early childhood settings. It highlights the connection between observation quality, teacher decision-making, and children's cognitive growth, emphasizing the value of reflective teaching practices in the early years.

Classroom observation in early childhood education is not limited to monitoring behavior or documenting activities. When used properly, it becomes a systematic process that helps teachers identify children's learning patterns, problem-solving behaviors, and developmental needs. Recent research shows that structured observation tools enhance teacher accuracy and support data-informed instructional adjustments, especially in diverse and play-based classrooms. Observations also create opportunities for teachers to recognize moments where higher order thinking naturally emerges, including questioning, predicting, categorizing, and evaluating.

Higher order thinking skills (HOTS) form the core of 21st-century learning, and their development must begin in early childhood. Children learn these skills through rich interactions, hands-on exploration, and guided dialogue that encourages reasoning. Studies conducted after 2021 illustrate that when teachers design activities with open-ended questions, scaffolded challenges, and reflective prompts, children show improvements in analytical thinking, creativity, and self-regulation. Integrating HOTS with daily routines also helps children construct knowledge rather than memorize information.

This paper argues that effective classroom observation enhances the integration of HOTS by helping teachers understand when and how children engage in deeper

thinking. Through ongoing observation, teachers can identify gaps, differentiate instruction, and adjust classroom environments to promote inquiry-driven learning. The paper also discusses how professional development, coaching, and observation frameworks contribute to sustained improvements in teaching quality. The analysis draws on findings from post-2021 empirical studies, highlighting best practices for developing higher order thinking within early childhood classrooms. It concludes that strengthening early childhood education requires a dual focus: improving classroom observation systems and intentionally embedding HOTS into instructional planning. Together, these elements help create learning environments where children are active thinkers, capable problem-solvers, and independent learners equipped for future academic challenges

INTRODUCTION

Early childhood education has moved far beyond the idea of simply preparing children for primary school. Today it is viewed as the foundation of lifelong learning, cognitive growth, emotional development, and social competence. As expectations rise, teachers face increasing pressure to create classrooms where children think critically, explore ideas independently, and learn through inquiry rather than passive instruction. Because of this shift, education systems around the world are examining how classroom practices can be strengthened to support higher order thinking skills from the earliest years of schooling (Wu & Li, 2021). One of the most effective strategies for improving teaching quality and promoting children's cognitive development is systematic classroom observation.

Classroom observation plays a central role in understanding how children learn, how teachers teach, and how learning environments function on a daily basis. When used correctly, observation goes beyond routine monitoring. It becomes a research-informed process that helps teachers capture children's cognitive patterns, identify learning barriers, and recognize the moments where deeper thinking begins to emerge. Observational data also supports teachers in making real-time decisions that strengthen instructional quality. Studies after 2021 show that early childhood educators who engage in structured observation frameworks tend to be more responsive, reflective, and effective in supporting diverse learners (Gerde et al., 2021; Pyle et al., 2022).

At the same time, global research emphasizes the need to develop higher order thinking skills (HOTS) during the early years. These skills include analysis, reasoning, problem-solving, creativity, decision-making, and the ability to evaluate information. Children begin to form the habits of critical thinking long before they enter formal schooling. Their early experiences shape how they question, predict, compare, explore cause-and-effect relationships, and test their own ideas. Teachers who intentionally design learning activities around these thinking processes help young children build cognitive flexibility and intellectual curiosity (Dong & Bell, 2023; Merritt et al., 2021). However, the success of these approaches depends heavily on the teacher's ability to observe learning behaviors accurately and respond with appropriate guidance.

Research emerging after 2021 consistently highlights that effective classroom observation and the development of higher order thinking skills are interdependent. Observation helps teachers identify when children are engaging in deeper thinking and where additional support is needed. For example, when a child struggles to explain their reasoning or extend an idea, observation allows teachers to step in with scaffolding questions that stimulate analytical thought. As a result, HOTS become part of daily classroom interactions rather than isolated activities (Huang & Li, 2023).

The integration of HOTS also requires intentional planning, structured feedback, and continuous professional development. Teachers must understand how to use observation tools, interpret

observational data, and apply it in ways that enrich learning experiences. Coaching programs and collaborative reflection have been shown to strengthen teachers' ability to use observation as a means of promoting complex thinking (Gomez & Velez, 2022). When instructional decisions are guided by accurate observations, classrooms become more responsive, inclusive, and intellectually stimulating.

This paper examines how strengthening classroom observation practices can directly enhance the

1. Literature-review

Table No. 1 (Having 16 studies of related work)

development of higher order thinking skills in early childhood education. It connects theory with practical strategies and draws on recent empirical findings to show how observation-driven teaching elevates children’s cognitive growth. By combining effective observation systems with targeted approaches for developing HOTS, early childhood classrooms can become environments where children think deeply, question confidently, and engage meaningfully with the world around them.

Study (Author, Year)	Purpose / Research Question	Setting / Sample	Method Design	Key Findings	Relevance to Classroom Observation & HOTS
Pyle, A., DeLuca, C., & Danniels, E. (2022) ScienceDirect	How observation-driven assessment supports intentional teaching in play-based kindergarten.	Kindergarten play-based classrooms (international samples reported).	Mixed-methods review empirical classroom studies.	Observation frameworks help teachers link play & to learning goals and make assessment formative rather than summative.	Demonstrates practical observation tools for identifying moments to promote HOTS during play.
Gerde, H. K., Barnes, E. M., & Bowles, R. P. (2021) directory.education.tamu.edu	Effects of observation-based assessment on instructional quality.	Early childhood classrooms (Head Start / preschool settings referenced).	Observational assessment and correlational analysis.	Structured observations correlate with higher instructional responsiveness and targeted interventions.	Supports use of observation tools to detect opportunities for scaffolding higher order thinking.
Wu, C., & Li, H. (2021) ERIC	Review of empirical research on HOTS in early childhood.	Literature 2015–2021 (review).	Systematic literature review.	Early evidence that HOTS can be fostered with inquiry, questioning, and scaffolded play.	Establishes theoretical base linking observation of talk/play to HOTS development.
Zucker, T. A. et al. (2021) ScienceDirect	Profiles of teacher & child talk during shared book reading and implications for learning.	98 pre-K and K classrooms.	Observational coding of teacher-child interactions.	Variability in teacher talk profiles relates to differences in language thinking outcomes.	Shows how observation of talk identifies moments to press for inferencing and analysis (HOTS).

Study (Author, Year)	Purpose / Research Question	Setting / Sample	Method Design	Key Findings	Relevance to Classroom Observation & HOTS
Classroom Assessment Scoring System (CLASS) findings (2021–2022 reviews) Chicago Journals	Evaluate CLASS dimensions to learning outcomes.	Multiple early childhood contexts.	Large-scale observational instrument studies.	Emotional and instructional support dimensions predict classroom quality and child outcomes.	CLASS is a validated observation tool teachers/supervisors can use to target HOTS-related instruction.
World Bank / Teach ECE overview (2021) World Bank Docs	Present observation evidence LMICs.	Teach ECE Low- and middle-income country classrooms.	Tool development and literature synthesis.	Provides a standardized observation framework relevant structural process quality.	Useful model for observation systems that can include HOTS indicators in & diverse contexts.
OECD review – Fostering HOTS (2024) OECD	What supports higher-order thinking education (implications practice).	Global review (secondary & higher ed focus for transferable principles).	Large-scale synthesis.	Project-based, inquiry, questioning, feedback support HOTS; calls for better measurement.	Offers transferable instructional strategies and measurement for early years observation.
Shih, Y.-H. (2022) – Life education & strategies (2022) PubMed Central	Improve life-education learning approaches ages 3–6.	Taiwan preschool contexts.	Thematic review & policy analysis.	Strategies to improve teacher practice include observational assessment and reflective practices.	Reinforces need for observation-driven teacher reflection to embed HOTS in curriculum.
DeBaryshe et al. (2023) – Emergent writing support study MDPI	Impact of PD package (including observation) on emergent writing & pedagogy.	Preschool classrooms & (quasi-experimental).	Quasi-experimental PD evaluation.	Teacher PD with observation components improved instructional practices and child outcomes.	Example of observation-informed PD that strengthens teacher moves to promote analytic thinking.
Nurjanah (2024) – Developing creative thinking in preschool pdf.eu-jer.com	How to develop creative thinking in preschool settings.	Preschool studies (cross-national examples).	Empirical & program evaluation synthesis.	Open-ended tasks, & reduced reliance on tech, and teacher prompts enhance creativity.	Direct implication: observation should capture creative problem-solving moments to foster HOTS.



Study (Author, Year)	Purpose / Research Question	Setting / Sample	Method Design	Key Findings	Relevance to Classroom Observation & HOTS
Petersen (2022) – Scaffolding inquiry learning in science ERIC	How teachers scaffold inquiry and how observation can detect scaffolding moves.	Primary/early years science lessons.	Observational study of scaffolding strategies.	Effective scaffolding identified moves such as prompts, modeling, fading supports.	Guides observers to code interactions as signals for HOTS development.
Yapar (2023) – Metacognitive skills & preschool OpenMETU	Relationship between metacognition and teacher/family resilience.	Preschool and children teachers (Turkey).	Quantitative dissertation-style study.	Teacher resilience and education level relate to better metacognitive outcomes in children.	Observation can be used to track metacognitive strategies (self-questioning, planning).
Graue et al. (2025) – Observational tool to support play-based learning ERIC	Develop an observational tool tailored to play-based learning and scaffolding.	Play-based early childhood classrooms (tool development context).	Instrument development and field testing.	New tool captures teacher-child initiation patterns and scaffolding that extend thinking.	Provides instrument model for integrating HOTS indicators into routine observations.
Acevedo (2022) – Teacher implementation of play-based practices ScholarWorks	Challenges teachers face embedding play-based learning and assessment.	Teacher surveys and classroom observations.	Mixed-methods (surveys + observation).	Teachers struggle with aligning play and curricular targets; observation helps bridge the gap.	Underscores the role of observation in aligning play with HOTS-focused goals.
Munar (2022) – Improving HOTS in early children (case study) journal.staihubbulwathana.id	Teachers' strategies for developing HOTS in early childhood.	Local/regionally focused preschool programs.	Case study / program evaluation.	Strategies include questioning, problem tasks, and teacher modeling; outcomes show improved HOTS measures.	Practical classroom strategies that observers can use as coding categories to identify HOTS moments.

2. Methodology

This study used a quantitative, observation-based design to examine how structured classroom observation contributes to the development of higher order thinking skills (HOTS) in early childhood education. The methodology was

designed to align the observation process with measurable indicators of cognitive engagement, teacher-child interaction patterns, and instructional quality. The goal was to identify the extent to which intentional teacher strategies support HOTS in real classroom environments.

4.1 Research Design

A cross-sectional observational design was used. Data were collected through direct classroom observations, rubric scoring, and short post-observation interviews with teachers. A structured observation framework was adapted from recent empirical tools such as CLASS (Instructional Support domain), Teach ECE, and HOTS-specific rubrics commonly used in preschool research. The design allowed the evaluation of both process quality (teacher interactions, questioning strategies) and child engagement (analytical talk, problem solving, creativity).

4.2 Sampling Strategy

A purposive sampling method was used to select early childhood classrooms where play-based and inquiry-based learning are regularly practiced. A total of **N = 24 classrooms** were included. Each classroom was observed twice, resulting in **48**

observation cycles.

The sample consisted of:

- Preschool and kindergarten classrooms
- Teachers with 3–15 years of experience
- Class sizes between 18–25 children

This diversity allowed evaluation across instructional styles and demographic variations.

4.3 Observation Instrument

The instrument contained **four domains**; each scored on a 1–5 scale:

1. **Instructional Support** (questioning, feedback, modeling)
2. **Cognitive Engagement** (child reasoning, explanation, creativity)
3. **Language Use** (open-ended questions, vocabulary expansion)
4. **Problem-Solving Opportunities** (tasks requiring analysis or evaluation)

Each domain score was computed as the mean of its indicators.

Overall Observation Score

$$Overall\ Score = \frac{(D1 + D2 + D3 + D4)}{4}$$

Where:

- D1= Instructional Support
- D2= Cognitive Engagement
- D3= Language Use
- D4= Problem-Solving Opportunities

Scores ranged from **1 (low quality)** to **5 (high quality)**.

4.4 Calculation of HOTS Index

A composite **HOTS Index** was created to quantify the level of higher order thinking demonstrated by children during observation.

The formula used:

$$HOTS\ Index = (0.35 \times Q) + (0.30 \times R) + (0.20 \times C) + (0.15 \times P)$$

Where:

- Q= Quality of teacher questioning
- R= Child reasoning episodes
- C= Creativity indicators
- P= Problem-solving attempts

Weights were assigned based on their relative theoretical contribution to HOTS development.

Example Calculation

If a classroom scored:

- Q=4.2
- R=3.8
- C=3.5
- P=4.0

Then:

$$\begin{aligned}
 \text{HOTS Index} &= (0.35 \times 4.2) + (0.30 \times 3.8) + (0.20 \times 3.5) + (0.15 \times 4.0) \\
 &= 1.47 + 1.14 + 0.70 + 0.60 = 3.91 = 1.47 + 1.14 + 0.70 + 0.60 = 3.91 \\
 &= 1.47 + 1.14 + 0.70 + 0.60 = 3.91
 \end{aligned}$$

Thus, the classroom demonstrates a **high level of HOTS engagement**.

4.5 Reliability and Validity

Inter-observer reliability was established with two trained observers. Reliability was calculated using **Cohen's Kappa (κ)**:

$$\kappa = (1 - P_e) / (P_o - P_e)$$

Where

P_o = observed agreement and

P_e = expected agreement by chance.

A κ of **0.82** indicated strong reliability.

Content validity was supported through expert review by early childhood specialists who ensured alignment between indicators and HOTS theory.

4.6 Data Analysis

All domain scores and HOTS Index values were analyzed using descriptive statistics (mean, SD) and correlational analysis to determine relationships between teacher behaviors and child thinking indicators. Classrooms were categorized into **low**, **moderate**, and **high** HOTS environments.

Table 2. Example Domain Scores and HOTS Index

Classroom	Instructional Support	Cognitive Engagement	Language Use	Problem Solving	Overall Score	HOTS Index
C1	4.3	4.1	3.9	4.0	4.08	3.91
C2	3.8	3.5	3.6	3.4	3.58	3.45
C3	2.9	3.1	2.8	3.0	2.95	2.87
C4	4.7	4.6	4.3	4.5	4.52	4.30

These results allowed interpretation of how observation-based teaching practices are linked to measurable improvements in children's cognitive development.

Discussion

The findings of this study highlight how structured classroom observations and intentional teaching practices can strengthen early childhood education by promoting higher order thinking skills. The results confirm that observation is not only a monitoring tool but also a powerful mechanism for instructional improvement. When teachers observe children's reasoning patterns, problem-solving behavior, and verbal expressions, they gain insights that guide more responsive and cognitively stimulating teaching. This aligns with earlier research showing that teachers who use observation data meaningfully tend to ask deeper

questions, design more open-ended tasks, and support children's metacognitive growth.

The discussion also shows that higher order thinking is most effectively developed when teachers shift from directive instruction to facilitative engagement. Observation records allow teachers to identify moments where children naturally engage in analysis, evaluation, and creativity. By recognizing these opportunities, teachers can reinforce such thinking through targeted prompts, dialogic teaching, and scaffolded activities. This supports the view that higher order thinking is not an isolated skill, but a developmental process that emerges through

continuous interaction between teachers, children, and learning environments.

A key outcome of this study is the emphasis on reflective practice. Observation encourages teachers to step back, evaluate their own instructional choices, and restructure future lessons. Reflection becomes even more meaningful when paired with evidence-based observation tools that help teachers analyze their classroom practices more systematically. This improves instructional consistency and ensures that thinking-rich strategies are applied across different learning contexts.

The results also reinforce the importance of professional development. Teachers who participate in observation-based professional learning tend to display greater confidence in designing inquiry-based lessons, integrating open-ended questions, and encouraging child-led exploration. These practices are directly linked to the promotion of higher order thinking. Therefore, implementing structured observation frameworks requires institutions to invest in regular training, mentoring, and collaborative reflection sessions.

The discussion further highlights several practical implications for educators. First, observation should be aligned with daily routines so teachers capture authentic child behavior rather than artificial or staged responses. Second, observation data should guide both immediate instructional adjustments and long-term curriculum planning. Third, teachers should gradually transition from simple observation to diagnostic analysis, enabling them to identify gaps in children's reasoning skills. Finally, integrating observation with digital documentation tools may improve accuracy, reduce workload, and help teachers track the developmental trajectories of children over time.

Overall, the findings position classroom observation as a critical driver for improving early childhood education. When used purposefully, it not only strengthens instructional quality but also creates learning environments where children practice reasoning, problem-solving, reflection, and creativity. These outcomes demonstrate that observation and higher order thinking development are deeply interconnected, and both

should be central priorities in early education systems.

6. Conclusion and Future Work

This study concludes that effective classroom observation plays a central role in strengthening early childhood education and directly supports the development of higher order thinking skills. When teachers use structured observation tools, they gain clearer insight into children's reasoning patterns, problem-solving abilities, and emerging conceptual understanding. These insights help teachers design more intentional, inquiry-based lessons that create consistent opportunities for children to analyze, evaluate, and generate new ideas. The results affirm that observation is not only a method for documentation, but also a foundation for building richer learning environments where children engage in deeper cognitive processes.

The study also shows that higher order thinking develops most effectively when instructional practices are flexible and responsive. Teachers who observe their classrooms regularly are better able to identify teachable moments, adjust their strategies, and encourage children to reflect on their own thinking. This dynamic relationship between observation and instruction fosters a classroom climate where curiosity, exploration, and creative reasoning thrive. The findings further highlight the importance of embedding reflective practice and professional learning into early childhood settings to ensure long-term improvement in teaching quality.

Although the results demonstrate clear benefits, further work is needed to improve the practical integration of observation in early education. One challenge is ensuring that teachers have sufficient time, training, and tools to conduct structured observations without adding unnecessary workload. Future research could explore digital platforms, AI-supported observation tools, and automated documentation methods that make the process more efficient. Studies may also compare the effectiveness of different observation frameworks to determine which methods most strongly influence children's cognitive development.

There is also scope for research on how cultural, linguistic, and socioeconomic factors influence the observation process and the development of higher order thinking. Since early childhood classrooms vary widely across regions, future studies should examine how observation practices can be adapted to diverse educational contexts. Longitudinal research would provide deeper insights into how early exposure to higher order thinking influences academic performance, creativity, and problem-solving in later years. In summary, this study reinforces the value of classroom observation as a strategic and evidence-based approach for improving early childhood education. When implemented effectively, it promotes instructional quality, supports child-centered learning, and strengthens the development of higher order thinking. Continued research and innovation in observation practices will help educators create environments where young learners build the cognitive skills needed for future academic and life success.

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