

# Preschool Teachers' Knowledge and the Integration of Higher-Order Thinking Skills (HOTs) in Classroom Pedagogy

Yan Tong<sup>1</sup>, Abdul Halim Bin Masnan<sup>1\*</sup>, Charanjit Kaur Swaran Singh<sup>2</sup>

<sup>1</sup>Faculty of Human Development, Universiti Pendidikan Sultan Idris, Malaysia, <sup>2</sup>Faculty of Languages and Communication, Universiti Pendidikan Sultan Idris, Malaysia

\*Corresponding Author Email: [abdul.halim@fpm.upsi.edu.my](mailto:abdul.halim@fpm.upsi.edu.my)

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## Abstract

The incorporation of Higher-Order Thinking Skills (HOTs) in early childhood education is gradually given emphasis in present-day curricula. The study aims to explore preschool teachers' knowledge in using Higher-Order Thinking Skills (HOTs) in classroom pedagogy. Preschool teachers' knowledge in implementing Higher-Order Thinking Skills (HOTs) in classroom is a prerequisite for their competency, and this may be attained through the utilisation of varied teaching techniques or strategies acquired throughout teacher education. The study employs a qualitative research approach using document analysis of academic sources such as journal articles and other related documents of early childhood education on Higher-Order Thinking Skills (HOTs). Findings reveal that preschool teachers' theoretical comprehension of Higher-Order Thinking Skills (HOTs), beliefs, teaching techniques, and curriculum expectations strongly shape their teaching and learning decisions. Past studies gradually highlight that inadequate knowledge in implementing Higher-Order Thinking Skills (HOTs), teaching techniques and pedagogical knowledge contribute to low-level questioning, lack of cognitive challenge, and teacher-centred activities. On the contrary, preschool teachers with balanced content knowledge and theoretical understanding are more likely to produce inquiry-based activities that contribute to promote problem-solving. This review shows that preschool teachers' knowledge and exposure on pedagogical techniques are critical factors of Higher-Order Thinking Skills (HOTs) and propose that more enhanced and targeted continues professional development is needed to support preschool teachers' conceptual knowledge and pedagogical aspects for their instructional practices.

**Keywords:** Higher-Order Thinking Skills (HOTs), Preschool Education, Preschool Teachers

## Introduction

As China continues to expand economically and socially, its education system is undergoing substantial transformation. Traditionally, teaching was dominated by collective approach, where teaching was directed to the entire class rather than to individual learners. In contrast, individualised child has emerged only recently and is experiencing a steady rise in demand. In

China, kindergartens are overseen and funded by provincial government, and there are no unified national standards. However, the Chinese central government established fundamental standards for early childhood education in 2001, which included physical education, language, science and mathematics, the arts, and social studies. Most parents insist that teachers instruct their toddlers in phonics for instance sound-letter correspondence, letters, and numbers because they are eager to see their children learn to read. Moreover, parents are keen to enrol their children in extracurricular activities such as ballet, violin, piano, and English classes.

Higher-order thinking skills have long been emphasized, but in the 21<sup>st</sup> century they are viewed as increasingly important. With the rapid growth and global spread of information, much of which may be misleading, learners need to develop critical, analytical, and evaluative skills to make sense of complex and often contradictory sources. The integration of higher-order thinking skills in early childhood education within Chinese kindergartens is closely associated with preschool teachers' pedagogical beliefs and practices.

As China's society has undergone substantial transformation, the goals of education have shifted from rote memorisation toward fostering holistic development. To remain competitive globally in business, education, science, and technology, China has increasingly emphasized the promotion of critical thinking rather than a sole focus on factual knowledge and examination performance. The National Guidelines for Medium and Long-Term Educational Reform and Development (2010–2020) were issued by the Chinese government in 2010. The document put emphasis on competencies such as teamwork, communication, problem-solving, and independent research (Fang et al., 2022). For the reform to be effective, teachers needed training in new instructional approaches and the development of new skills. Although some training was provided by the government, experts have criticised it as largely ineffective (Hu et al., 2021). The training focused mainly on theory and consisted of hours of lectures on government rules and policies (Liss et al., 2023). Experts noted that teachers were reluctant to sit through lectures on theory in large groups (Maree, 2022). Few teachers were instructed on how to apply the new methods in practice, and there was no clear guidance on conducting practical learning activities (Gao & Xiao, 2022). For example, during the training program, teachers were only told why thinking skills are important for children's cognitive development and how they could be taught. They were not provided with concrete examples of how to implement thinking skills instruction with children.

This suggests that, even when teachers receive training, many still find it difficult to implement new teaching methods. As part of an effective teacher development program, teachers should be exposed to the types of tasks and lessons they will use in the classroom (Fu et al., 2024). Other scholars have also argued that teachers training should be practical, focused on real-life situations, participatory, and interactive (Fang et al., 2022). Teacher development should be a process that integrates theory and practice, reinforcing both. This was not the case in China, where education reform occurred without an effective professional development program. Those responsible for the training may have struggled to teach the new curriculum effectively because they had not themselves been trained in critical thinking. In this context, there is a need to explore preschool teachers' knowledge in using Higher-Order Thinking Skills (HOTS) in classroom pedagogy.

The psychological progress of young children in China is influenced by the teaching competency of preschool teachers (Fang et al, 2022). Additionally, preschool teachers' short and long-term teaching competencies may be shaped by the knowledge and skills they acquire during teacher education programs (Roy et al., 2022). How young learners acquire and comprehend knowledge can be influenced by what they are taught in kindergarten. This has led Chinese policymakers to place specific emphasis on preschool teachers' ability to educate, both in the classroom and through their teacher training programs (Ministry of Education of People's Republic of China, 2019). There is an urgent need to enhance preschool teachers' teaching skills and reform teacher education to ensure that young children genuinely benefit from early childhood education (ECE) (Fang et al., 2022).

Efficient mastery of teaching knowledge is a prerequisite for preschool teacher competency, and this can be achieved through the use of various classroom management strategies and techniques learned during teacher education (Rezunova, 2023). Preschool teachers' competencies encompass supporting children's growth, facilitating ennobled learning experiences, and promoting their holistic and balanced physical and mental development (Rezunova, 2023).

The rapid development of information in the 21<sup>st</sup> century demands that education systems, specifically early childhood education (ECE), place emphasis on the development of higher-order thinking skills (HOTS), such as analysis, evaluation, and creation. These skills are essential for young learners to process complex information effectively. Preschool teachers, being the adults closest to the children, play a crucial role in nurturing and developing higher-order thinking skills (HOTS) through their pedagogical beliefs and instructional practices. Present research has accentuated the impact of teachers' beliefs on their instructional strategies. For example, recent studies show that constructivist teaching beliefs are positively associated with the implementation of developmentally appropriate practices (DAP) in selected Chinese kindergartens. In addition, the relationship between teachers' beliefs and practices is crucial for the effective integration of HOTS in the context of early childhood education (Song, 2023). Nevertheless, translating teachers' pedagogical beliefs into practice can be challenging and is often complex.

Other factors, including teachers' cultural expectations, institutional constraints, and curriculum standards, can mediate this relationship, understanding how instructional strategies act as a mediating variable between teachers' pedagogical beliefs and classroom practices, specifically in relation to the integration of higher-order thinking skills (HOTS) in Chinese kindergartens, is crucial for improving the effective implementation of HOTS in early childhood education.

Preschool teachers' pedagogical beliefs and classroom practices have a substantial impact on the quality of education, as they shape teachers' understanding of how children learn, how to organise information, and how to teach (Roy, 2022). Given that children's cognitive, social, and emotional development is strongly influenced by the environments and experiences they encounter, it is essential to examine the attitudes and practices of early childhood teachers (ECEC) (Wang & Zhang, 2022). Hu et al. (2021) said that teachers' beliefs are a complex and multidimensional construct that has a significant impact on their decisions, perceptions, relationship with students, and classroom management.

Beliefs are the mental acceptance and psychological underpinnings that shape how individuals behave in response to their perceptions of reality (Hu et al., 2021). Examining the relationship between teachers' knowledge, pedagogical beliefs and practices can reveal how their personal convictions influence their classroom actions (Mohamed and Al Qaryouti 2016). However, there is disagreement regarding the exact nature of the relationship between teachers' beliefs and their practices. Based on this issue, a literature analysis is required to examine previous studies on preschool teachers' knowledge in using Higher-Order Thinking Skills (HOTS) in classroom pedagogy.

### **Research Methodology**

This study employs a qualitative research design, employing thematic analysis as the primary method to obtain accurate findings. The analysis focuses on previous studies concerning teachers' knowledge in using Higher-Order Thinking Skills (HOTS) in classroom pedagogy, which constitutes the main objective of this research. Thematic analysis is a methodology employed for the examination of qualitative data, involving the systematic exploration of a given dataset in order to discern, scrutinise, and subsequently communicate recurring patterns (Braun & Clarke, 2006). The aforementioned approach serves as a means of delineating data, yet it concurrently entails the exercise of interpretation during the stages of code selection and theme construction. One notable characteristic of thematic analysis lies in its inherent adaptability, enabling its utilisation across a diverse array of theoretical and epistemological paradigms.

### **Literature Review Analysis**

This article provides a review of past studies that discuss previous studies on preschool teachers' knowledge in using Higher-Order Thinking Skills (HOTS) in classroom pedagogy. This review examines preschool teachers' knowledge, practices, and challenges in applying higher-order thinking skills effectively in the classrooms. The purpose is to determine whether preschool teachers have effectively used higher-order thinking skills, particularly in the teaching of early childhood education subjects.

#### *Preschool Teachers' Knowledge*

According to Yusof et al. (2018), preschool teachers' knowledge of higher-order thinking skills comprising subcomponents for instance lesson planning, questioning techniques, and cognitive strategies shows that these skills must be efficiently transmitted to learners during the teaching and learning process. This knowledge, comprising Bloom's taxonomy, the use of open-ended questions, and targeted lesson planning, plays a critical role in nurturing and cultivating preschool learners' critical and creative thinking skills. These skills enable children to engage in thinking processes such as curiosity, information gathering, and applying knowledge to solve complex problems.

According to Kumar and Mohamed (2022), preschool teachers still had doubts about the concepts of higher-order thinking skills despite attending numerous related courses (Hassana et al., 2017). Similarly, teachers reported that they lack a clear and adequate understanding of HOTS. They are often unable to apply HOTS model, fully comprehend HOTS, and determine which approaches to use in teaching these skills (Daud et al., 2015). This indicates multiple challenges in achieving higher standards of education. When preschool teachers have a limited understanding of HOTS' elements, it can negatively affect students and marginalise

the application of HOTS during instruction. The development of a society with advanced high-level thinking skills depends on teachers' ability to understand and effectively implement HOTS.

The Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) serves as the foundation for high-level thinking skills. Teachers' failure to master the Revised Bloom Taxonomy can hinder the instructional process. Hassan et al. (2017) noted that some teachers still lack a clear understanding these cognitive levels during teaching and learning. Moreover, scholars have observed that even when teachers are aware of the basic cognitive levels of Bloom's Taxonomy, they often demonstrate a limited understanding and are unable to distinguish the functional differences among the levels (Abdullah et al., 2015). This indicates that teachers' knowledge of thinking skills remains below the required standard. If this issue persists, preschool teachers will struggle to design appropriate instructional materials and learning activities aligned with the taxonomic levels.

According to Ariffin and Yunus (2017), only 50% of teachers recognised as excellent teachers in Malaysia were able to deliver instruction effectively to 50% of their students. As a result, students remained passive during the teaching and learning process and were unable to engage in discussions because teachers did not actively develop students' HOTS. This was attributed to teachers' ineffective teaching techniques and their limited in-depth understanding of how to implement HOTS in learning and facilitation. High-level thinking skills require teachers who are knowledgeable across all subject areas, not only in selected domains (Chew, 2017).

Scholars have reported that preschool teachers lack awareness of the importance of implementing HOTS and, at the same time, possess limited understanding and knowledge of how to apply HOTS techniques in their instructional processes (Abd. Aziz & Mohamed, 2021; Nor et al., 2016). These issues contribute to preschool teachers' unpreparedness in effectively implementing HOTS in the classroom.

The teaching of HOTS in the preschool classroom is closely linked to teacher content knowledge and pedagogical skills (Ibrahim & Mohamed, 2021; Buyong et al. 2020). Additionally, preschool teachers face challenges in determining specific thinking skills should be emphasised during instruction. As a result, there is often overlap among skills such as analytical, creative, critical and problems solving abilities during teaching. Some teachers demonstrate uncertainty and negative mindset when selecting and implementing appropriate HOTS strategies. They also exhibit a lack of self-confidence and insufficient training to integrate HOTS into classroom instruction (Zarina, 2016; Hassana et.al., 2017). Consequently, effective HOTS pedagogical practices cannot be implemented, and teachers tend to rely on traditional teaching methods.

### *Teaching Techniques*

Preschool teachers lay the foundation for children's cognitive development, particularly their higher-order thinking skills. However, teachers may be unable to support the development of these skills if they do not understand what higher-order entails or how to effectively promote it in the classroom (Kelley, 2018). Given the strong emphasis on memorization and standardized testing in many parts of the Chinese education system, it is important to

examine whether preschool teachers possess the knowledge and skills needed to support the development of higher-order thinking among their learners (Kelley, 2018). Kelley (2018) reported that learning was tended to be short-term and largely engrossed on memorisation. Instruction emphasized content coverage and knowledge accumulation, as teachers followed prescribed lists of topics that students were expected to master by the end of each lesson.

To meet the demands of standardised tests, some teachers adopt teacher-centred approaches to teach to the test, which does not promote students' critical thinking. Teachers are often trained to ask higher-order thinking questions only in the context of teaching writing, yet many lack the pedagogical skills needed to apply this knowledge effectively (Pillay et al., 2018). Therefore, it is important to examine the need for instructional tools that foster critical thinking skills (Perdanasari et al., 2021). Existing teaching tools have not significantly improved students' thinking abilities (Perdanasari et al., 2021).

#### *Pedagogical Knowledge Contributes to Low-Level Questioning*

It has also been reported that several preschool teachers rely on low-level thinking questions and frequently repeat the same questions during teaching process (Walsh & Kemp, 2019). To foster students' higher-level thinking instruction, preschool teachers need to diversify their teaching techniques so that learners remain active and engaged. Furthermore, some teachers are accustomed to using conventional strategies 'chalk and talk' strategies (Le Yee & Mohamed, 2021; Othman & Kassim, 2017). Such approaches can create challenges for teachers in adopting and implementing 21<sup>st</sup>-century teaching practices in the classroom. Consequently, this issue contributes to low levels of HOTS implementation in preschools (Chew, 2017).

Furthermore, limitations in implementing and practising HOTS are also attributed to insufficient time allocation for teachers to cover essential content within each subtopic while engaging in effective lesson planning (Othman & Kassim, 2017). A lack of knowledge and skills in designing daily lesson plans that integrates HOTS further challenges teachers. Consequently, time constraints contribute to the limited or absent use HOTS in teaching and learning. In addition, the lack of instructional support materials for HOTS can hinder its implementation. Hence, preschool teachers may be perceived as failing to incorporate HOTS into the teaching and learning process (Muhammad et al., 2016).

#### *Lack of Cognitive Challenge*

According to a study by Nachiappan et al. (2018) that used the qualitative method to observe how Higher Order Thinking Skills (HOTS) are implemented in teaching and learning in preschool, teachers consistently employ only three levels of HOTS: applying, analyzing, and evaluating. without correctly implementing the HOTS four-level "creating" component. Preschool teachers consistently employ thinking, remembering, and understanding levels, which stand for lower order thinking skills, according to another study. For example, the majority of Malaysian preschool teachers only employ lower-order thinking skills, according to qualitative research (Zaharah et al., 2019) that used instrument observation, interviews, and documentation. They recommended that in order to improve the thinking abilities of their students, preschool teachers should learn how to grasp higher order thinking capabilities. Preschool instructors' instruction of higher-order thinking abilities is lacking as a result of these circumstances. The gap that results from preschool instructors' poor HOTS

practices makes it clear that knowledge and comprehension gaps must be addressed in order to prevent ineffective information transfer. The notion of HOTS is still unclear to many preschool teachers, who mistakenly believe it is synonymous with critical and creative thinking skills (Abdul Halim et al., 2019).

#### *Teacher-Centred Activities*

Among the challenges inherent in integrating HOTS in preschool, Fernández and Feliu (2017) note that when preschool teachers enter the classroom, the methods they use are often traditional and do not promote the development of HOTS among learners. This is because teachers tend to focus primarily on teaching and learning of artistic content, while less attention to methodological and philosophical training. Prior research indicates that the development of higher-order thinking abilities is becoming increasingly significant in educational institutions worldwide. Tan et al. (2023), for instance, assert that the ability to solve problems is a critical competency for the twenty-first century. The necessity for these abilities, particularly critical thinking, stems from the understanding that today's problems require individuals who can assess data, consider circumstances, and make informed decisions (Fu et al., 2023). However, incorporating Higher Order Thinking Skills into instructional strategies isn't always effective, particularly in China's preschool system.

#### **Conclusion**

Early childhood education in China has changed a lot and represents an educational approach that emphasizes higher order thinking skills (HOTS), creativity, communication, collaboration, and the integration of technology in the teaching and learning process. Within the context of early childhood education, the implementation of higher-order thinking by preschool teachers plays a crucial role in ensuring the effectiveness of instructional process in shaping preschool learners grow their minds. High-order thinking abilities are regarded as the most critical skill to possess in order to thrive in the twenty-first century. Since new issues arise daily in the information and technology age, it is necessary to employ more innovative teaching and learning strategies.

Past studies reveal that the readiness of preschool teachers to implement higher-order thinking remains at a low level. Readiness includes knowledge, skills, and attitudes. Preschool teachers with robust pedagogical and higher-order thinking knowledge are better prepared to teach effective and relevant content o early childhood education aligned with contemporary demands.

However, precise kinds of professional training programs that best support preschool-aged children in developing higher-order thinking skills require further investigation. In China, where preschool education is expanding rapidly and quality and innovation are becoming increasingly crucial, this is particularly crucial. Future studies should examine the long-term effects of teacher preparation on children's cognitive development as well as the variables that may influence the effectiveness of training programs in various Chinese regions.

Studies on preschool teacher support of young children's development of higher-order thinking abilities reveal a complex environment consisting of opportunities, difficulties, and evolving teaching strategies (Nachiappan et al., 2018). Although older students are typically thought of as having higher-order thinking capabilities, more and more individuals are

beginning to recognize that young children can benefit from these abilities. They build the groundwork for critical thinking and future academic performance (Pillay et al., 2018). Giving preschool instructors the information and abilities they need to support their pupils in developing these cognitive abilities has already been shown to be crucial by researchers (Singh et al., 2017; Thomas & Thorne, 2010). According to Pillay et al. (2018), there are issues with using higher order thinking skills that have been examined and may benefit from more study. The training and professional development received by preschool teachers in this region is a crucial research topic. Higher-order thinking skills should be taught to young children, according to the 2013 Early Childhood Curriculum reform, which places a strong emphasis on using these abilities in a scientific manner. These standards align with the teaching of these abilities in early childhood education.

Previous research gradually reveals that low-level questioning, a lack of cognitive challenge, and teacher-centered activities are all influenced by a lack of understanding of how to incorporate Higher-Order Thinking Skills (HOTs), teaching strategies, and pedagogical knowledge. Conversely, preschool teachers who possess a balanced theoretical and subject knowledge are more likely to create inquiry-based activities that support the development of problem-solving skills. In order to support preschool teachers' conceptual knowledge and pedagogical aspects for their instructional practices, this review demonstrates that their exposure to and knowledge of pedagogical techniques are critical factors of Higher-Order Thinking Skills (HOTs). It also suggests that more focused and improved ongoing professional development is required.

In conclusion, based on the literature review, the implementation of higher-order thinking among preschool teachers needs support in terms of training, professional development, and attitudinal change toward educational innovation. With enhanced readiness in knowledge, skills, and attitudes, preschool teachers have the potential to integrate higher-order thinking into teaching and learning that is far more effective, and pertinent to the needs of preschool learners. Some argue that the curriculum should be used in different school contexts or that future study should concentrate on different kinds of research methodologies. For students to be able to compete worldwide in the twenty-first century, critical thinking abilities are crucial (Kurnia & Caswita, 2020). Critical thinking, according to Anwar and Mutiah (2022) and Saputri et al. (2022), is the capacity to consider facts, generate and arrange ideas, bolster opinions, compare things, draw conclusions, evaluate arguments, and resolve issues. Consequently, collaboration among schools, administrators, and educational agencies is essential in founding an ecosystem that supports the pedagogical transformation of preschool teachers toward a more progressive and impactful direction.

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