INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 11, Issue 2, (2022) E-ISSN: 2226-6348

Preschool Teachers' Knowledge, Understanding and Practice towards Higher Order Thinking Skills

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To Link this Article: http://dx.doi.org/10.6007/IJARPED/v11-i2/13108 DOI:10.6007/IJARPED/v11-i2/13108

Published Online: 13 April 2022

Abstract

Malaysian education system is striving to produce a creative, innovative and intelligent generation to face the competition in the global market. Among the skills that are prioritized to produce this generation is Higher Order Thinking Skills (HOTS). All curricula including the Preschool Curriculum have undergone a transformation due to the HOTS agenda. As an effort to inculcate HOTS among children, preschool teachers have the key trust. Therefore, this study was conducted to examine the level of readiness of preschool teachers towards HOTS in terms of knowledge, understanding and implementation. A quantitative approach with survey study design was used in the study. A total of 367 preschool teachers in Malaysia were selected as study respondents through simple random sampling. The instrument used was a questionnaire adapted from another study. The data obtained were analysed descriptively through SPSS Version 26. Descriptive statistics were used to examine the mean score, standard deviation, frequency and percentage. The findings showed that the level of knowledge (mean = 4.08) of preschool teachers about HOTS, the level of understanding (mean = 3.98) of preschool teachers about HOTS and the level of implementation (mean = 3.96) of HOTS in preschool learning and facilitation were at high level. The results of the study proved that preschool teachers have high level of readiness for the implementation of HOTS. This study can increase the positive perception of HOTS among other preschool teachers and encourage them to demonstrate high commitment in implementing HOTS in learning and facilitation.

Keywords: Higher Order Thinking Skills, Preschool Teachers, Knowledge, Understanding, Practice

Introduction

The Ministry of Education Malaysia has introduced the Malaysian Education Development Plan 2013-2025 (PPPM 2013-2025). The goal of PPPM 2013-2025 is to provide a framework and guidelines to an educational professional regarding the education initiative from 2013 to 2025. Promoting and nurturing Higher Order Thinking Skills (HOTS) among students is one of the main agendas of PPPM 2013-2025. The ministry aims to transform the landscape of education and to produce skilled and competent students (Lasan et al., 2017). The application of HOTS in education was not a new thing in Malaysia. The application of

HOTS in education has been highlighted since 1994. However, HOTS draw attention to every educational professional when it is officially included in PPPM 2013-2025.

As a result, HOTS has also been integrated into the National Pre-school Curriculum Standard (KSPK). It is explicitly stated in the KSPK so that preschool teachers can interpret them in the teaching and learning process clearly and accurately. High-level thinking skills nurtured from early childhood can stimulate children's thinking skills from an early age (Saptari et al., 2021). In addition, the transformation of the HOTS-based education system is in line with the current scenario as educators are teaching generation Z students, not generation X.

Teachers are the implementers of the curriculum. Therefore, teachers must be knowledgeable and skilled in implementing a learning activity that applies HOTS in the classroom. Adequate knowledge and a clear understanding of the concepts of HOTS may help teachers in implementing meaningful and effective teaching and learning in the classroom. Knowledge and skills of HOTS may assist teachers to plan learning activities that are appropriate to children's ability. The commitment of preschool teachers to implementing high-level thinking skills in teaching and learning is a determinant of educational success as preschool teachers play a dominant role in building a strong education foundation for children (Ariffin & Yunus, 2017).

The implementation of HOTS in teaching and learning at the preschool level is still questionable. Do preschool teachers know, understand, and apply elements of HOTS in their teaching and learning activities? Previous studies have focused on the readiness of secondary and primary school teachers to HOTS but did not consider seriously the readiness of preschool teachers to HOTS. Thus, this study was conducted to obtain certainty on the level of readiness of preschool teachers in terms of knowledge, understanding, and practice of HOTS. In particular, this study was conducted to achieve the listed objectives:

- To identify the level of knowledge of preschool teachers on HOTS
- To identify the level of understanding of preschool teachers on HOTS
- To identify the level of practice of HOTS in teaching and learning in the preschool classroom

Literature Review

Thinking skills are mechanisms that utilize mindset to plan, draw conclusions and find solutions to a problem (McPeck, 2016; Chaffee, 1992; Barell, 1991; Shamilati et al., 2017). Scholars noted that a high-level thinking process occurs when individuals obtain new information and compile the information to establish a relationship with existing knowledge to solve a complex problem (Osman, 2015). Therefore, HOTS has been defined by the Ministry of Education Malaysia (2014) as the ability to apply knowledge in new situations, interpret logically, make inferences and decisions when encountered with an issue, thus inventing innovations.

The application of high-level thinking in learning and facilitation can reduce uncertainty and increase students' interest in the tasks given by the teacher (Ariffin & Yunus, 2017). High-level thinking skills focus on the four highest levels of thinking in accordance with Bloom's Taxonomy Hierarchy consisting of application, analysis, evaluation, and innovation (Anderson & Krathwohl, 2001). Ultimately, an individual who can solve problems, make accurate and wise decisions, produce beneficial innovation, and can invent new inventions in any form during the learning process can be considered as high-level thinking. In general, HOTS serves as an aid tool used to inculcate critical thinking among students (Abdul Rahman, 2018).

The constantly changing education system in Malaysia requires teachers who are willing to master high-level thinking skills. The success of a new curriculum requires cooperation from all parties, especially educators as the key player in cultivating high-level thinking skills among students. However, several factors hinder the application of high-level thinking skills from being implemented in preschool.

Scholars claimed that a few teachers were still unclear about the concept of HOTS despite having attended related courses (Hassana et al., 2017). Similarly, other scholars stated that teachers in Malaysia still did not understand the HOTS meaning, model usage, and approach that should be used (Daud et al., 2015). In addition, scholars also argued that teachers' knowledge in the aspect of HOTS was still low as they were unclear about the meaning of HOTS (Kassim & Zakaria, 2015). This can pose great challenges in achieving a better and more progressive standard of education. If teachers are not clear about the elements of HOTS, it will adversely affect students, and the opportunity to implement HOTS during teaching and learning may be marginal. The formation of a society with high-level thinking skills depends on the competence of teachers who understand and use HOTS.

The Revised Bloom Taxonomy (Anderson & Krathwohl, 2001) was used as the basis for high-level thinking skills. The failure of teachers in mastering taxonomy will decelerate the teaching and learning process. Some teachers are still vague about the use of these levels in the teaching and learning process (Hassana et al., 2017). In addition, scholars viewed that although teachers know the basic cognitive levels of Bloom's Taxonomy they still did not understand the functional differences for each level in the taxonomy (Abdullah et al., 2015). This indicated that teachers' knowledge of thinking skills was still below the proper level of mastery. If preschool teachers do not master the taxonomic levels, they are unable to plan appropriate teaching and learning activities or assignments.

Scholars reported there are many excellent teachers in Malaysia. However, in a study conducted in 2011, only 50% of teaching was delivered to students effectively (Ariffin & Yunus, 2017). Thus, students did not actively involve in the teaching and learning process for high-level thinking due to ineffective teaching techniques. This situation occurred due to the lack of knowledge and in-depth understanding about the implementation of HOTS during learning and facilitation. High-level thinking skills require teachers who are knowledgeable in all subject areas, not only in option areas (Chew, 2017).

Scholars also revealed that preschool teachers were aware of the importance of the implementation of HOTS, but they lack knowledge and understanding of the HOTS application methods in their teaching and learning activity (Abd. Aziz & Mohamed, 2021; Nor et al., 2016). These issues lead to the unpreparedness of preschool teachers in implementing HOTS effectively in the preschool classroom.

The implementation of HOTS in the preschool classroom is still associated with pedagogical issues and teacher content knowledge (Ibrahim & Mohamed, 2021; Buyong et al. 2020). In fact, teachers are deemed to encounter constraints in determining specifically the skills that should be focused on in teaching and learning activities. As a result, there is an overlap of functions of various skills such as critical, creative, and analytical skills during teaching and learning. A handful of negative-minded teachers are uncertain in selecting and applying proper HOTS strategy, lack self-confidence, and insufficient training to incorporate HOTS elements to students (Zarina, 2016; Hassana et.al., 2017). As a result, effective HOTS pedagogical practices cannot be implemented as teachers are not adequately prepared, and gradually, teachers will become comfortable with normal classroom routine practices only.

Scholars stated that many preschool teachers applied low-level thinking questions and occasionally the same questions were re-asked (Walsh & Kemp, 2019). To inculcate high-level thinking of students in the learning process, teachers should diversify their teaching methods so that students remain active and more interested in learning. Moreover, scholars also argued that some teachers are comfortable using conventional teaching methods, "chalk and talk" (Le Yee & Mohamed, 2021; Othman & Kassim, 2017). This teacher has difficulty in adapting and implementing 21st-century teaching methods in their classroom. This situation resulted in low levels of HOTS implementation in preschools (Chew, 2017).

Furthermore, the constraints in practicing HOTS are due to very limited and insufficient time allocation for educators to teach important content in each subtopic and integrate efficient planning (Othman & Kassim, 2017). The lack of knowledge and skills in planning daily lesson plans with the incorporation of HOTS causes teachers to be burdened. Besides, time constraints also cause no or less application of HOTS in teaching and learning. Moreover, the neglect of the use of HOTS teaching aids can disrupt its implementation. Thus, teachers will be considered to have failed to practice HOTS (Muhammad et al., 2016).

Methodology

Research Design

A quantitative approach through survey study design was used in this study. It is one of the most popular and frequently used methods to study a phenomenon that is occurring (Abdul Ghaffar, 2003). A survey study design is a quantitative research procedure in which the researcher can conduct a survey on a sample or an entire population to identify the attitudes, behaviors, traits, or opinions of the population (Creswell, 2008). This study was conducted to examine the level of knowledge, understanding, practice of HOTS by preschool teachers. This study focused on data collection through quantitative methods. Therefore, a questionnaire was used as an instrument to collect responses from the respondents in this study.

Population and Sample of Study

The population in this study consisted of 9000 preschool teachers all over Malaysia. A total of 367 preschool teachers were selected as the study sample. Sample sizes were determined based on the sample size determinant table of (Krejcie and Morgan, 1970). A simple random sampling technique was used to determine the sample of this study. Simple random sampling is the most appropriate method when the population shows similar features (Yahaya et al., 2018).

Research Instruments

The instrument used was a questionnaire adapted from a previous study entitled ‘Perceptions of Malay language teachers in secondary schools on high-level thinking skills’ (Hassan & Mahmod, 2016). The questionnaire was modified according to the needs of this study. The questionnaire instrument consisted of four sections, namely sections A, B, C, and D. Section A covered the demographic information of the respondents. This section collected respondent data including gender, age, academic qualifications, teaching experience, school category, and exposure to high-level thinking skill courses. In sections B, C, and D, the questionnaire was divided into three constructs encompassing aspects of knowledge and understanding of preschool teachers as well as the practice of HOTS in teaching and learning. There were 10 question items for each construct to obtain relevant responses on the implementation of HOTS for levels of knowledge, understanding, and practice of HOTS in the

preschool classroom. Each item was given five answer options based on five -point Likert scale rated from 1 to 5 as shown in Table 1.

The reliability value of the study questionnaire items was determined through Cronbach's alpha coefficient. The level of reliability of the constructed instrument was found to be good as the Cronbach's alpha value exceeded 0.9 ($\alpha > 0.9$). Besides, the instrument also showed a good value of content validity index (CVI). The CVI is 0.951, 0.915, and 0.934 respectively for sections B, C, and D. Thus, the overall CVI for the questionnaire was 0.967.

Table 1
Five-point Likert scale

Scale	Item response
1	Strongly disagree
2	Disagree
3	Moderately agree
4	Agree
5	Strongly agree

Data Analysis

Data collected using questionnaire were analysed through Statistical Package for Social Science (SPSS) Version 26 for descriptive data description. Descriptive statistics were used to determine mean, standard deviation, frequency and percentage. Each finding was used to answer each research question. Table 2 presented the interpretation of the mean scores for this study. Interpretation of the mean score was based on sources from the Education Policy Planning and Research Division (BPPDP) (2006) in the study of Hassan and Mahmod (2016) to assess the mean level of each variable in this study.

Table 2
Interpretation of mean score

Average Score	Interpretation
1.00-1.89	Very low
1.90-2.69	Low
2.70-3.49	Moderate
3.50-4.29	High
4.30-5.00	Very high

Results and Discussion

A total of 367 respondents participates in this study. Table 3 shows the profiles of the respondents. Based on the descriptive analysis conducted, it was found that the percentage of male teachers was 3.3% (*n* = 12), while female teachers were 96.7% (*n* = 355). As for age, it showed 8.2% respondents (*n* = 30) aged less than 25 years old, 43.1% respondents (*n* = 158) aged 26 to 35 years old, and 48.8% respondents (*n* = 179) aged over 35 years old. Meanwhile, for the professional qualification, 1.6% respondents (*n* = 6) have Teaching Certificate, 20.4% respondents (*n* = 75) qualified with Diploma in Education, 55.6% respondents (*n* = 204) were Degree in Education holder, 15.5% respondent (*n* = 57) qualified with Master of Education and the remaining 6.8% respondents (*n* = 25) have other qualifications.

As for teaching experience, 8.4% respondents (*n* = 31) have less than 3 years experience, 31.6% respondents (*n* = 116) have experience from 4 to 10 years, 18.5%

respondents (*n* = 68) have experience from 11 to 15 years, 28.6% respondents (*n* = 105) have experience from 16 to 20 years, and 12.8% respondents (*n* = 47) have more than 21 years of experience. Respondents in this study come from both urban and rural schools. The percentage of respondent in urban schools was 47.1% (*n* = 173) and 52.9% respondents (*n* = 194) were in rural schools. In addition, 62.9% respondents (*n* = 231) attended the HOTS course, while 37.1% (*n* = 136) had never attended the course. The results proved that the number of respondents who attended the HOTS course exceeded those who had never attended the course.

Table 3
Profile of Respondents

Criteria		***n (f)***
Gender	Man	12 (3.3%)
	Women	355 (96.7%)
Age	Under 25 years old	30 (8.2%)
	26-35 years old	158 (43.1%)
	35 years and older	179 (48.8%)
Professional Qualification	Teaching Certificate	6 (1.6%)
	Diploma in Education	75 (20.4%)
	Degree in Education	204 (55.6%)
	Master of Education	57 (15.5%)
	Others	25 (6.8%)
Teaching Experience	Less than 3 years	31 (8.4%)
	4-10 years	116 (31.6%)
	11-15 years	68 (18.5%)
	16-20 years	105 (28.6%)
	21 years and above	47 (12.8%)
School Category	Urban schools	173 (47.1%)
	Rural schools	194 (52.9%)
HOTS course	Yes	231 (62.9%)
	No	136 (37.1%)

Preschool Teachers' Knowledge about HOTS

Table 4 exhibits that the overall mean score for the aspect of preschool teachers' knowledge of HOTS was at high level (*M* = 4.08; *SD* = 0.268). Of the 10 items listed, it was found that the B5 item, recorded the highest percentage among other items, which was 87.2%. Meanwhile, the B10 item recorded the lowest percentage of 76.8%. The level of knowledge of preschool teachers in this study was high as the majority of respondents, namely 62.9% respondents (*n* = 231), have attended HOTS courses and have received early exposure. In fact, respondents who had never attended the HOTS course also demonstrated high level of knowledge. This was due to the fact that HOTS was not a new agenda for teachers. Prospective preschool teachers in the Institute of Teacher Education are also given exposure to HOTS even though they have not yet become qualified preschool teachers.

The findings of this study are contrary to the previous study on the readiness of teachers for the integration of high-level thinking skills in preschool teaching and learning (Sandra, 2019). The study discovered that preschool teachers were lack knowledge and understanding of the HOTS concept completely. Teachers' knowledge is the basis of their

abilities in conducting quality teaching and learning activities. When preschool teachers have sufficiently broad knowledge of HOTS, they will implement it more effectively in the teaching process.

Table 4
Descriptive Analysis on Preschool Teachers' Knowledge on HOTS

Code	Items	*n* (%)				
		1	**2**	**3**	**4**	**5**
B1	I know the content of the syllabus for HOTS	0	2 (0.5)	50 (13.6)	211 (57.5)	104 (28.3)
B2	I know how to apply HOTS	0	2 (0.5)	60 (16.3)	212 (57.8)	93 (25.3)
B3	I know how to use various strategies and techniques to teach HOTS	1 (0.3)	2 (0.5)	64 (17.4)	208 (56.7)	92 (25.1)
B4	I know how to teach thinking skills using the HOTS approach	0	2 (0.5)	65 (17.7)	211 (57.5)	89 (24.3)
B5	I know how to determine the content of lessons based on children's abilities	0	1 (0.3)	46 (12.5)	221 (60.2)	99 (27.0)
B6	I know how to actively involve children in the learning process	0	1 (0.3)	49 (13.4)	217 (59.1)	100 (27.2)
B7	I know how to develop a child's individual potential	0	3 (0.8)	52 (14.2)	215 (58.6)	97 (26.4)
B8	I know how to assess the development of children in HOTS	0	5 (1.4)	73 (19.9)	196 (53.4)	93 (25.3)
B9	I have the knowledge to inculcate children's thinking skills in each teaching and learning activity	0	3 (0.8)	65 (17.7)	207 (56.4)	92 (25.1)
B10	I have sufficient knowledge to develop children's high-level thinking skills	0	5 (1.4)	80 (21.8)	199 (54.2)	83 (22.6)

* Scales of 1, 2, 3, 4 and 5 were based on a five-point Likert Scale.

Preschool Teachers' Understanding on HOTS

Table 5 shows that the overall mean score for the aspect of preschool teachers' understanding of HOTS was at high level (M = 3.98; SD = 0.270). The results of this study exhibited that the C2 item recorded the highest percentage of 85.6%, while the C8 item recorded the lowest percentage of 55.1%. Based on the findings of the study, the level of understanding of preschool teachers on HOTS revealed that preschool teachers have now begun to understand the concept of HOTS better. This proved that preschool teachers are in the process of adapting themselves to the currents of change in the education system. They have mastered the content of the curriculum, the use of technology, various teaching techniques so that HOTS can be implemented in teaching effectively. However, the findings of this study are contrary to the results of previous research on teachers' perceptions of HOTS (Hassan & Mahmod, 2016). It was reported that the level of teachers' understanding of HOTS was still at moderate level. Moreover, there were external environmental factors such as the category of secondary school teachers which differentiated the results of both studies focusing on preschool teachers.

Table 5
Descriptive Analysis on Preschool Teachers' Understanding on HOTS

Code	Items	*n* (%)				
		1	**2**	**3**	**4**	**5**
C1	The HOTS course that I have attended provided a good understanding it	1 (0.3)	6 (1.6)	106 (28.9)	179 (48.8)	75 (20.4)
C2	I understand the implementation of HOTS concept in the classroom	0	4 (1.1)	49 (13.4)	223 (60.8)	91 (24.8)
C3	I understand how to apply HOTS in every aspect of learning	0	6 (1.6)	63 (17.2)	201 (54.8)	97 (26.4)
C4	I understand the objectives of HOTS in the context of learning	1 (0.3)	6 (1.6)	53 (14.4)	209 (56.9)	98 (26.7)
C5	I understand about cognitive and meta-cognitive aspects	1 (0.3)	8 (2.2)	86 (23.4)	196 (53.4)	76 (20.7)
C6	I understand every function of thinking tool that can be used in HOTS	0	5 (1.4)	79 (21.5)	201 (54.8)	82 (22.3)
C7	I understand about Bloom's taxonomy	0	7 (1.9)	54 (14.7)	211 (57.5)	95 (25.9)
C8	I understand about the concept of CoRT by De Bono	5 (1.4)	22 (6.0)	138 (37.6)	157 (42.8)	45 (12.3)
C9	I understand effective questioning techniques to encourage children to think in terms of HOTS	0	3 (0.8)	61 (16.6)	213 (58.0)	90 (24.5)
C10	I understand the implementation aspects of high-level thinking skills in project-based learning and problem-based learning	0	5 (1.4)	67 (18.3)	197 (53.7)	98 (26.7)

*Scales of 1, 2, 3, 4 and 5 were based on a five-point Likert Scale.

Preschool Teachers' Practice on HOTS

Descriptive analysis findings revealed preschool teachers demonstrate a high level of HOTS practice in the classroom (M = 3.96; SD = 0.298). Table 6 shows a detailed descriptive analysis of preschool teachers' practice. The results showed that the D4 item recorded the highest percentage of 87.5%, while the D8 item recorded the lowest percentage of 55.0%. The findings of this study are supported by Nachiappan et al (2019) who studied the implementation of HOTS by teachers in teaching and learning activities in kindergartens. The study reported that teachers implemented HOTS in their teaching and learning in kindergarten by applying elements of HOTS such as skills of analyzing, investigating, applying, describing, comparing differences, and classifying information. A high level of knowledge and understanding of preschool teachers on HOTS indirectly impacted the level of implementation of HOTS in the preschool classroom. The implementation of HOTS in the preschool classroom is associated with pedagogical issues and teacher content knowledge.

Table 6
Descriptive Analysis on Preschool Teachers' Practice on HOTS

Code	Items	*n* (%)				
		1	**2**	**3**	**4**	**5**
-D1	I am designing a HOTS-based	0	3 (0.8)	60 (16.3)	191 (52.0)	113 (30.8)
D2	I use various HOTS strategies and techniques	0	3 (0.8)	66 (18.0)	199 (54.2)	99 (27.0)
D3	I teach using an incorporation approach	0	8 (2.2)	88 (24.0)	184 (50.1)	87 (23.7)
D4	I determine the content of the lesson based on the student's abilities	1 (0.3)		45 (12.3)	211 (57.5)	110 (30.0)
D5	I have adequate teaching aids for HOTS-based	0	10 (2.7)	115 (31.3)	180 (49.0)	62 (16.9)
D6	I actively involve students in the HOTS-based	0	1 (0.3)	62 (16.9)	209 (56.9)	95 (25.9)
D7	I evaluate the development of students in HOTS	0	8 (2.2)	82 (22.3)	188 (51.2)	89 (24.3)
D8	I have sufficient time to conduct activities that encourage students' HOTS	3 (0.8)	18 (4.9)	144 (39.2)	137 (37.3)	65 (17.7)
D9	I used to train children to participate in competitions to improve their HOTS. (e.g., Competitions: STEM, Science, creating projects or experiments)	4 (1.1)	12 (3.3)	67 (18.3)	185 (50.4)	99 (27.0)
D10	I still design and run HOTS-based learning-from-home even in pandemic situation	2 (0.5)	18 (4.9)	110 (30.0)	159 (43.3)	78 (21.3)

*Scales of 1, 2, 3, 4 and 5 were based on a five-point Likert Scale.

Conclusion

Overall, the level of readiness of preschool teachers based on knowledge, understanding, and implementation of HOTS was at a high level. Preschool teachers with sufficient knowledge and understanding of HOTS were able to implement HOTS in teaching and learning effectively and also able to realize the aspirations of the national education system. This study was conducted quantitatively with respondents consisting of 367 preschool teachers from all over Malaysia. The findings obtained can still clearly reflect the level of readiness of preschool teachers towards HOTS. Furthermore, this study is also expected to increase the positive perception of HOTS among preschool teachers. Since HOTS is a real scenario in preschool, it is suggested that further studies can be conducted to study the level of HOTS of children in preschool.

Acknowledgement

This study was funded by the Faculty of Education, Universiti Kebangsaan Malaysia through the research grant with code GG-2019-059.

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