LEVEL OF AWARENESS, CHALLENGES AND TEACHING STRATEGIES IN IMPLEMENTING HIGHER ORDER THINKING SKILLS AMONG TEACHERS OF SJK(C) IN KLUANG, JOHOR

WOO SOO FENG

A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Education (Educational Psychology)

School of Education
Faculty of Social Sciences and Humanities
Universiti Teknologi Malaysia

AUGUST 2021

DEDICATION

This project report is dedicated to my family especially my mother for the love and encouragement that has inspired me to pursue and complete this research.

ACKNOWLEDGEMENT

I would like to express my sincerest appreciation to the following beloved persons in providing supports and guidance to me in completing my research in this toughest period while dealing with the pandemic of Covid-19.

Foremost, I would like to offer this endeavor to my God for the wisdom he bestowed upon me, the strength, the blessing and good health in order to complete my research in this challenging period.

I would like to express my greatest gratitude towards my beloved family especially my mother for their endless love, encouragement and constant assistance which helped me in completion of this research. As a teacher, working from home and completing my research at the same time was not easy to me, however, with their unceasing supports, I would be able to complete my research during this difficult time.

I would like to express my special gratitude and thanks to my supervisor, Assoc. Professor. Dr. Narina bt A. Samah for the supervision, guidance and constant support by giving constructive comments and suggestions to me in helping me to complete my research. My knowledge has been empowered and I feel really fortunate to work under her direction.

Last but not least, I would also like to extend my appreciations to the lecturers, my classmates of Master of Education (Educational Psychology) Pesisir Kluang, colleagues, friends and primary school teachers from SJK (C) in Kluang for supporting me and helping me in completing my research. Million thanks for your great support and kind understanding.

Thank you.

ABSTRACT

Teaching strategies of Higher Order Thinking Skills are essential in this 21st century pedagogy classroom as creating the idea exploration learning environment can encourage students to think outside the box and master the skills efficiently. Teachers play important roles in implementing HOTS and thus their level of awareness on the importance of implementation of HOTS is vital too. This research investigated the relationships among the variables such as level of awareness on the importance of implementation of HOTS, degree of challenges confronted and the frequency of HOTS teaching strategies applied by the teachers. A set of questionnaires consisted of 28-item was distributed to 217 primary school teachers from Sekolah Jenis Kebangsaan (Cina) in the district of Kluang, Johor. The data were analysed by using SPSS illustrated that majority of respondents were teachers aged 31 to 45 years old (49.2%). Most of them are teaching in urban area (79.4%) with more than ten years teaching experience (43.5%). Descriptive analysis showed that the level of awareness among primary school teachers in SJK (C) in the district of Kluang was moderate. They felt quite challenging in implementing HOTS and their biggest challenge was time constraint. They also seldom applied teaching strategies of HOTS. Based on the analysis using Spearman's correlation test, the findings revealed that there were significant relationships between level of awareness and the frequency of HOTS teaching strategies applied, and the degree of challenges and the frequency of HOTS teaching strategies applied. In general, teachers' level of awareness and their degree of challenges confronted contribute to their frequency of implementing HOTS teaching strategies. Hopefully, this research could provide significant insight for teachers in implementing effective teaching strategies of HOTS.

ABSTRAK

Strategi pengajaran Kemahiran Berfikir Aras Tinggi amat penting dalam kelas pedagogi abad ke-21 kerana ia dapat mewujudkan persekitaran pembelajaran yang menerokai idea supaya dapat mendorong pelajar berfikir di luar kotak dan menguasai kemahiran ini dengan cekap. Guru memainkan peranan penting dalam melaksanakan KBAT maka tahap kesedaran mereka mengenai kepentingan pelaksanaan KBAT juga penting. Penyelidikan ini mengkaji hubungan antara pemboleh ubah seperti tahap kesedaran mengenai kepentingan pelaksanaan KBAT, tahap cabaran yang dihadapi dan kekerapan strategi pengajaran KBAT yang diterapkan oleh para guru. Satu set soal selidik yang merangkumi 28 item diedarkan kepada 217 guru dari Sekolah Jenis Kebangsaan (Cina) di daerah Kluang, Johor. Data dianalisis dengan menggunakan SPSS telah menunjukkan majoriti responden adalah guru berusia 31 hingga 45 tahun (49.2%). Sebilangan besar mereka mengajar di kawasan bandar (79.4%) dengan pengalaman mengajar lebih dari sepuluh tahun (43.5%). Analisis deskriptif menunjukkan tahap kesedaran di kalangan guru sekolah rendah di SJK (C) di daerah Kluang adalah sederhana. Mereka berasa cukup mencabar dalam menerapkan KBAT dan cabaran terbesar mereka adalah kekangan masa. Mereka juga jarang menerapkan strategi pengajaran KBAT. Berdasarkan analisis menggunakan ujian korelasi Spearman, ia menunjukkan bahawa terdapat hubungan signifikan antara tahap kesedaran dan kekerapan strategi pengajaran KBAT yang diterapkan, dan tahap cabaran dan kekerapan strategi pengajaran KBAT yang diterapkan. Secara umum, tahap kesedaran guru dan tahap cabaran yang dihadapi menyumbang kepada kekerapan mereka melaksanakan strategi pengajaran KBAT. Berharap kajian ini dapat memberi impak yang penting terutamanya dalam melaksanakan strategi pengajaran KBAT yang effektif.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

HOTS	-	Higher Order Thinking Skills
SJK (C)	-	Sekolah Jenis Kebangsaan (Cina)
KBAT	-	Kemahiran Berfikir Aras Tinggi
SPSS	-	Statistical Package for the Social Sciences
RQ	-	Research Question

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Higher order thinking skills (HOTS) are implemented in Malaysia education since 2013 and students are encouraged to think outside the box as well as beyond literal questions. According to Abdullah et al. (2019), the highest-level skill in human cognitive process is higher order thinking skills. When a person receives information, he will organize, associate and use it with his prior knowledge to generate a solution or idea to solve the problem (Ministry of Education, 2012a as cited in Abdullah et al., 2019). In brief, it promotes critical thinking skills of the students to apply, analyze, synthesis, and evaluate information instead of simply recalling facts. This corresponds to Bloom's learning taxonomy (Bloom, 1956 as cited in Ballakrishnan and Mohamad,

2020) as HOTS is defined as the skills that beyond knowledge and comprehension that comprise analysis, synthesis and evaluation. In addition, students can remember longer and better through higher order thinking skills learning process as the information obtained by the students via HOTS are efficiently conveyable (Bavani, 2012 as cited in Ballakrishnan and Mohamad, 2020). Hence, teachers are expected to inculcate HOTS elements to encourage students to think deeper while solving problems in this 21st century pedagogy classroom in line with the aspiration of the Malaysian Education Blueprint 2013-2025 as the concept of higher order thinking skills is to produce students who possess high and competitive values that may meet the demands of the 21st century (Ministry of Education, 2012a as cited in Abdullah et al., 2019).

Karim et al. (2018) states that the cultivation of thinking skills at primary school level is vital as thinking skills should be trained since young. Besides, primary school level is the best time to promote and develop thinking skills as this level is considered as the basic foundation for further education (Seman et al., 2017). The only way to inculcate HOTS among primary school students is by integrating these skills in the teachers' lesson plans (Karim et al., 2018). Thus, primary school teachers play important roles in cultivating HOTS elements as they need competencies in HOTS and skills in designing teaching strategies. The teaching strategies employed should involve activities that promote analysis, synthesis, and evaluation which is beyond comprehension in order to enhance students' higher order thinking skills (Christian and Paulus, 2020). Nevertheless, teachers acknowledge that it is difficult to implement HOTS in teaching and learning process as they prefer to apply teacher-centered approach by giving exercise that might focus only on learning facts rather than the deeper concept (Christian and Paulus, 2020). Consequently, students only comprehend without having a deep understanding to apply the knowledge (Christian and Paulus, 2020). Thus, this phenomenon must be investigated so that teachers are aware of the importance of implementing HOTS and they should able

to employ effective teaching strategies to implement HOTS in order to facilitate students to apply their knowledge during the learning process.

Specifically, this research is conducted to investigate the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers. Besides, the study investigates the degree of challenges confronted by the teachers in developing higher order thinking skills among primary school students. Next, the study investigates the frequency of teaching strategies applied in developing higher order thinking skills among primary school students. Additionally, the relationship between the level of awareness on the importance of implementation of HOTS in teaching among teachers and their frequency of teaching strategies applied will be examined to identify whether the level of awareness among teachers will affect their frequency of teaching strategies applied in developing higher order thinking skills. Lastly, the relationship between the degree of challenges confronted by the teachers with the frequency of teaching strategies applied and will be examined too in order to find out whether the frequency of teaching strategies applied are affected by the degree of challenges confronted by the teachers.

1.2 Background of the Study

1.2.1 The Implementation of HOTS in Class

The aspiration of Malaysian Education Blueprint 2013-2025 is to develop students who are master higher order thinking skills including critical thinking, reasoning,

creative thinking and innovation (Seman et al., 2017). However, throughout the years, most of the students especially primary school students are still unable to think critically and they are weak in problem solving especially while requiring higher order thinking skills. This phenomenon can be seen while they are answering HOTS questions in their examinations as the questions that required high order thinking skills have been raised at all levels of assessment, including Primary School Assessment (UPSR), Lower Secondary Assessment (PMR) and Malaysian Certificate of Education (SPM) (Supramani, 2006; Lembaga Peperiksaan Malaysia, 2013 as cited in Seman et al., 2017).

Bavani et al. (2016) revealed that the implementation of thinking skills in primary schools had been overlooked and this led to students' low achievements in tasks related to higher order thinking skills. On the other hands, Ballakrishnan and Mohamad (2020) affirms that many teachers have insufficient knowledge and strategies in teaching thinking skills and also, they are ineffective in selecting appropriate methods to teach HOTS. Some researchers also revealed that majority of teachers did not know how to teach for HOTS and some teachers were reluctant to do so (Ballakrishnan and Mohamad, 2020). In addition, low efficacy of teachers to teach HOTS, insufficient exposure and the scarcity of resources are the factors contributing to the lesser implementation of HOTS in Malaysian schools (Ravinder Singh, 2013 as cited in Ballakrishnan and Mohamad, 2020). In fact, teachers faced challenges to employ teaching strategies of HOTS especially primary school teachers. Based on Seman et al., (2017), primary school teachers were burdened with non-teaching tasks that took up 40% of their time and they need to explain, analyze and adjust the curriculum standards and themes related to teach higher order thinking skills. Hence, the challenges confronted by the teachers should be discovered and teachers should be equipped themselves and always aware that they must develop students' habits of mind and metacognition simultaneously in subject content lessons so that students are able to acquire higher order thinking skills (Bavani et al., 2016).

Ballakrishnan and Mohamad (2020) states that the objective of the teaching and learning of higher order thinking skills is to develop students' abilities to comprehend, analyze and synthesize information. Teachers should have proper planning and understanding of basic concepts of HOTS so that this objective can be achieved among the students. Vijayaratnam (2012) as cited in Ballakrishnan and Mohamad (2020) asserts that the country needs students with high cognitive thinking skills to respond to the real-world demands. Gulistan et al. (2015) as cited in Ballakrishnan and Mohamad (2020) suggests that activating the students' prior knowledge on how connect their prior knowledge and the new information through asking critical questions, using classroom activities and grouping approach were the teaching methods used by the teachers in their studies. Some past studies also found that teaching strategies such as inquiry, problem solving and learning cycle have been recommended to enhance HOTS.

1.2.2 Personal Reflections on Students' Achievement on Higher Order Thinking Skills Questions

The researcher had been teaching English for eight years in primary Chinese national school since 2012. As mentioned above, in line with the aspiration of the Malaysian Education Blueprint 2013-2025, higher order thinking skills (HOTS) are applied in Malaysia education since 2013 and students are encouraged to think beyond literal questions. Yet, till now, most of the students found it hard to apply their knowledge while solving HOTS questions. Students always tell that they cannot understand what the questions required and cannot think on any logical and creative answers for the questions. This phenomenon not only happened in English subject but even in Chinese Language as

well even though it is the student's mother tongue. Based on the researcher's observation, some students could not answer well in Chinese Language as well. The researcher concluded that it is not about the language's matter; it is their higher order thinking skills' issues. Almost every time after examination, teachers were complaining about students' responses in their exam papers particularly on questions that required higher order thinking skills. During item analysis on exam papers, it was common to identify those students were weak on higher order thinking skills question. Teachers always assumed that it was students' issues as they could not think critically and logically to respond to the specific questions.

The data below is taken from the researcher's school which provides the evidence of item analysis on five main subjects in recent examination papers in September, 2020.

Table 1.0 Data on Item Analysis in September, 2020 Examination in Researcher's School.

<table>
<tr><th>Subjects</th><th>Item Analysis in September, 2020 Examination</th></tr>
<tr><td>Malay Language</td><td>
<table>
<tr><th colspan="2">Dapatan</th></tr>
<tr><th>Bahasa Melayu (Pemahaman)</th><th>Bahasa Melayu (Penulisan)</th></tr>
<tr><td>1. Murid tidak menguasai sistem bahasa. Penguasaan kosa kata terhad.</td><td>1 Murid tidak dapat menulis struktur ayat yang betul. Kesalahan ejaan/imbuhan.</td></tr>
<tr><td>2. Murid tidak baca petikan (soalan subjektif)dengan betul/tidak fahami petikan.</td><td>2. Murid tidak bermotivasi untuk menulis karangan (Bahagian C). Kekurangan isi / isi yang sama</td></tr>
<tr><td>3. Murid tidak memahami kehendak soalan terutamanya soalan yang berunsur KBAT.</td><td>3. Tidak dapat menulis isi tersirat (Bahagian B)</td></tr>
</table>
</td></tr>
</table>

English Language	**ANALISIS ITEM BAHASA INGGERIS** **Dapatan** **Tahun 4**: 1. Murid lemah dalam past tense, conjunction-but, words with 'ow', using words to fill in the blanks. 2. Murid belum menguasai teknik menjawab soalan KBAT dan tidak dapat menjawab. **Tahun 5**: 1. Murid lemah dalam proverbs, punctuation, adjectives, social expression dan soalan pemahaman yang berunsur KBAT. 2. Murid tidak dapat menjawab kebanyakan soalan pemahaman yang berunsur KBAT. **Tahun 6**: 1 Murid lemah dalam adjectives, phrasal verbs synonym dan soalan pemahaman yang berunsur KBAT. 2. Beberapa murid masih lemah untuk menjawab soalan KBAT terutamanya murid yang lemah dalam kosa kata BI.
Chinese Language	**Dapatan** **Bahasa Cina (Pemahaman)**: 1. Murid lemah dalam memahami petikan terutamanya bagi isi tersirat yang memerlukan KBAT dan lemah dalam menjawab soalan KBAT. 2. Penguasaan kosa kata dan tatabahasa murid yang terhad **Bahasa Cina (Penulisan)**: 1 Murid tidak dapat menguasai teknik menulis struktur ayat yang betul 2. Murid tidak bermotivasi .(Tidak menulis karangan bahagian C)
Mathematics	**ANALISIS ITEM MATEMATIK (TAHUN 4,5,6)** **Dapatan** **Tahun 4**: 1. Murid lemah dalam topik pecahan dan peratus 2. Murid belum menguasai teknik menjawab soalan KBAT dalam kertas 2 **Tahun 5**: 1. Murid lemah dalam topik pecahan dan peratus 2. Murid sentiasa cuai apabila menjawab soalan KBAT. **Tahun 6**: 1 Murid lemah dalam topik pecahan dan peratus & topik bentuk dan ruang 2. Beberapa murid masih lemah untuk menjawab soalan KBAT.
Science	**ANALISIS ITEM SAINS (TAHUN 4,5,6) SEP** **Dapatan** **Tahun 4**: 1. Murid lemah dalam penguasaan Bahasa Cina sehinggakan tidak dapat menjawab dengan betul. 2. Murid belum menguasai teknik menjawab soalan KBAT **Tahun 5**: 1. Murid lemah dalam persoalan KBAT 2. Murid sentiasa cuai apabila menjawab soalan Sains. **Tahun 6**: 1 Murid cuai dalam menjawab soalan. 2. Murid sudah lupa tentang Konteks Sains Tahun 4 dan 5.

From Table 1.0 above, the data demonstrated that students are weak in answering higher order thinking skills questions. Instead, are teachers aware that it is not only students' issues, this might be due to teachers' teaching strategies which did not promote any higher order thinking skills in subject matter and create the learning environment which encourages critical thinking? Do they realize that students could not respond to higher order thinking skills questions throughout the years apparently were teachers' teaching methods issues? As illustrated on the table, some of the data provided Standard Four, Five and Six analysis which established that students in Standard Six still could not acquire higher order thinking skills well.

Apart from students, teachers themselves also found that they could not answer the higher order thinking skills questions in some examination papers. The researcher often heard that teachers were discussing on HOTS questions which they also did not know how to address. Seman et al. (2017) in their research revealed that teachers themselves did not have clear and comprehensive understanding about HOTS questions and how they can teach their pupils about something that they did not comprehend. After the answer was revealed, they just realized that how tricky of the question. From this context, are teachers equipped themselves with higher order thinking skills? Do they train to teach higher order thinking skills? These are the questions arousing in the researcher's mind.

Consequently, the researcher reflects that there is essential to investigate teachers' teaching strategies to promote higher order thinking skills especially national Chinese-type primary school teachers and their level of awareness on the importance of implementing higher order thinking skills to see whether the difficulty faced by students

in responding higher order thinking skills questions is a culpability of teachers' teaching strategies.

1.3 Problem Statement

The researcher found that the issues highlighted in the implementation of HOTS in the previous sections are the major concerns for teachers to cultivating HOTS. Since teaching for higher order thinking skills have been implemented formally in schools and Seman et al. (2017) demonstrated that 50%, 80% and 75% of questions asked in UPSR, Form Three Based Assessment and SPM core subject respectively were questions that measured higher order thinking skills in 2016. Significantly, it is crucial for teachers especially primary school teachers to be aware of the importance of implementation of HOTS and shift their focus to teach higher order thinking skills. Yao (2012) as cited in Gulistan et al. (2015) emphasized that teachers must build a comfortable environment which enables students to share their ideas, thoughts, personal experiences and inventions in order to facilitate their higher order thinking skills. Again, it is established that the role of teachers in creating the environment by using various teaching strategies in order to allow students to acquire higher order thinking skills is vital.

Therefore, to enhance students' higher order thinking skills, this research investigates the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers and also identifies the degree of challenges confronted by the teachers in developing HOTS. In addition, the frequency of teaching strategies applied in developing higher order thinking skills will be investigated.

According to Seman et al. (2017), the lack of emphasis on teaching higher order thinking skills during the teaching and learning process is one of the factors that cause students failure to master HOTS. Through the study, it may help teachers to explore various teaching strategies to be employed in the class and teachers who are less competencies about HOTS can use this research as an example to adapt the strategies to inculcate HOTS as the findings of a study done by Heri Retnawati et al. (2018) shown that teachers' knowledge on HOTS is still at a low level and in fact, many teachers are still confusing about the differences between HOTS and its strategies. This study seeks to provide significant knowledge on teaching strategies of implementation of HOTS. Further, the relationship between the level of awareness and the frequency of teaching strategies applied will be investigated to identify whether the level of awareness among teachers will affect their frequency of HOTS teaching strategies applied. Finally, the relationship between the degree of challenges confronted by the teachers and their frequency of teaching strategies applied will be examined too in order to find out whether the degree of challenges confronted by the teachers will give impact on the frequency of application of teaching strategies that promote HOTS.

1.4 Research Objectives

The objectives of this research are:

1.4.1 To investigate the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers.

1.4.2 To investigate the degree of challenge confronted by the teachers in developing higher order thinking skills.

1.4.3 To investigate the frequency of teaching strategies applied in developing higher order thinking skills.

1.4.4 To investigate the relationship between the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers and their frequency of teaching strategies applied.

1.4.5 To investigate the relationship between the degree of challenges confronted by the teachers and their frequency of teaching strategies applied.

1.5 Research Questions

This study attempts to address the following research questions:

1.5.1 What is the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers?

1.5.2 What is the degree of challenge confronted by the teachers in developing higher order thinking skills?

1.5.3 What is the frequency of teaching strategies applied in developing higher order thinking skills?

1.5.4 Is there any significant relationship between the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers and their frequency of teaching strategies applied?

1.5.5 Is there any significant relationship between the degree of challenges confronted by the teachers and their frequency of teaching strategies applied?

1.6 Research Hypotheses

Based on the research questions above, the research hypotheses are made as following:

1. H_{01}: There is no significant relationship between the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers and their frequency of teaching strategies applied.

2. H_{02}: There is no significant relationship between the degree of challenges confronted by the teachers and their frequency of teaching strategies applied.

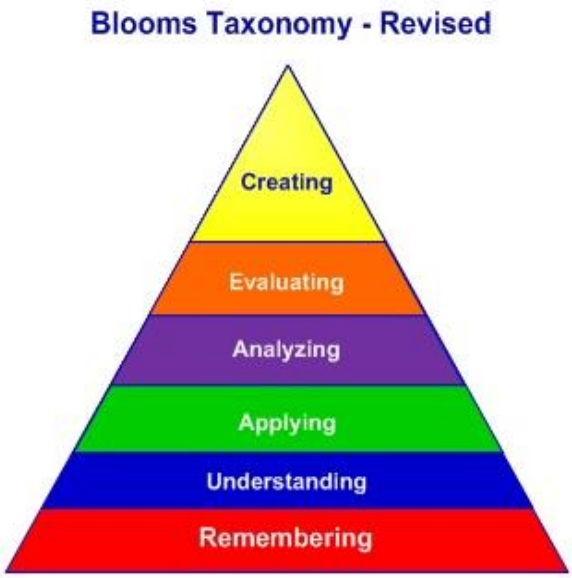
1.7 Theoretical Framework

The theoretical framework applied for this study is revised Bloom Taxonomy by Anderson and Krathwohl (2001) to describe higher order thinking skills in teaching and learning process. Subsequently, Piaget and Vygotsky's theories of cognitive development involve how learners acquire knowledge through complex cognitive processes and appropriate teaching strategies can be applied to enhance their acquisition of knowledge in order to move to higher cognitive levels are demonstrated.

1.7.1 Anderson's Revised Taxonomy (2001)

According to Rahman and Manaf (2017), Bloom's taxonomy gives impact on the teaching philosophies of the world particularly in enhancing higher order thinking skills and thus it is crucial for cognitive development among learners. Bloom's taxonomy had been revised by Anderson and Krathwohl in 2001 which emphasized on two cognitive domains that make up educational objectives: cognitive (knowledge) and affective (attitude). It comprises six levels of cognitive processes which are remembering, understanding, applying, analyzing, evaluating and creating; as shown in the figure below.

Figure 1.0 The Revised Bloom's Taxonomy by Anderson and Krathwohl (2001)
(Source: Bloom's Taxonomy Revised. The Peak Performance Center, 2020)



From the figure above, the levels used to reflect the increasing of difficulty of the cognitive domain. The three top levels are classified as higher order thinking skills which promote analyzing, evaluating and creating and the levels near the bottom are classified as lower order thinking skills which promote remembering, understanding and applying (Atiullah, 2019). The terms used in the revised version refer to the cognitive process that learners encounter and the knowledge that they work with. For example, the verb 'remembering' may involve learners in remembering or recalling previous learned information or existing knowledge where the term 'creating' in the highest level of cognitive process involves learners to generate new ideas or products or ways of viewing things by using their creative thinking. Accordingly, teachers should employ creative problem-solving teaching as some researches shown that creative problem-solving

teaching made students to have higher cognitive component, higher behavioral tendency in learning, and remarkably higher learning gain while comparing with general traditional teaching (Shieh et al., 2017). Chang et al. (2014) also revealed that integrating imaginative and creative thinking into learners' existing knowledge can promote their potential for solving problems. Students' creative and problem-solving skills can be fostered through hands-on activities as it allows students to coordinate their current knowledge, creative skills, and problem-solving abilities. Besides activities, Chang et al. (2014) indicated that a social environment supporting autonomy, competence, or task involvement helps promote learners' creativity. Teachers can create a flexible environment and form active group interactions among learners to reinforce their creativity. Hence, it is essential to establish a classroom environment which can promote learners' self-regulation and encourage them to develop their creative ideas, and to reinforce their problem-solving skills in a collaborative setting as creative collaboration can spur creativity.

In a nutshell, revised Bloom's taxonomy provides a valuable framework for teachers to concentrate more on higher order thinking to assist learners in developing their performance tasks, constructing problems or solving problems.

1.7.2 Piaget and Vygotsky's Theories of Cognitive Development

Cognitive development refers to the development of how humans think, explore and acquire knowledge to store in their long-term memory across their lifespan (Complex Cognitive Processes: Definition and Examples, 2016). Concept learning, problem

solving, metacognition, critical thinking and transfer are identified as the complex cognitive processes occur in learners' cognitive and these processes can help them to make sense of their experiences and as a result, they construct knowledge for storage in memory (Eggen and Kauchak, 2016). Since both Piaget and Vygotsky' theories acknowledged that learners can actively construct their own knowledge or understanding in nature and nurture and hence descriptions of how complex cognitive processes of learners related to the teaching strategies applied by teachers grounded on Piaget and Vygotsky' theories are demonstrated.

Piaget believed that learners construct knowledge by their own (Eggen and Kauchak, 2016). Learners tend to make sense of their experiences and construct their own knowledge. Learners need their prior experiences or knowledge to learn new information. They interpret between what they already know and what they are learning by connecting them to form a concept as concept learning. By constructing concepts, it assists learners to simplify what they learn and reduce the cognitive load on their working memories. To promote learners' cognitive development, teachers can plan their lessons based on Piaget's theory of activating learners' pre-existing schema and creating cognitive conflict through disequilibrium (Eggen and Kauchak, 2016). For example, teachers can ask students to build connections to concepts such as to sort a vocabulary list of shapes. Additionally, teachers can activate learners existing schema by requiring them to predict what would happen during the sorting process. By predicting, teachers can activate learners' prior knowledge as what learners already know is the basis of new learning. This enables learners' schemes or mental structures incorporate with new learning experience which is process of assimilation and this newly assimilated information will create cognitive conflict with previously formed mental structures and thus disequilibrium occurs. This situation encourages learners to seek equilibrium and as a result, accommodation happens. New mental structures will be developed when accommodation happens and consequently learners are able to construct their new knowledge. When

learners are actively construct their own understanding, learning is more meaningful. McLeod (2019) also stated that learners will develop and update their mental models to reflect the new information constantly and then construct their own interpretation of reality from their perceptions of the world. As a result, the main role of the teacher is to encourage this learning and reflection process so that learners are engaged by applying their existing knowledge and real-world experience to create their own learning. Furthermore, critical thinking activities should be implemented by teachers based on Piaget's theory as people want their experiences to make sense so they construct knowledge that makes sense to themselves by making and assessing conclusion based on evidence (Eggen and Kauchak, 2016). Critical thinking has to be integrated into the entire learning-teaching process as it involves high level reasoning skills to assess information using evidence as the foundation (Eggen and Kauchak, 2016). During critical thinking activities, students can draw logical conclusion from different perspectives such as they defend their answer based on their evidence or create generalization based on what they have discovered. Through these kinds of activities, students are practicing to put their discoveries into words and they are simultaneously promoting their critical thinking skills and deepening their understanding (Eggen and Kauchak, 2016).

Vygotsky's theories of using language as a tool to promote cognitive growth, creating mediated learning experiences, and scaffolding the lesson to help learners move to higher cognitive levels (Eggen and Kauchak, 2016). For instance, teachers can create a mediated learning experience by guiding them step-by-step through problem-solving project. Problem solving is one of the most importance process in human learning (Radvansky and Ashcraft, 2014). There are four major cognitive processes while solving problems. First, learners understand the problem by identify the problem goal. Next, they develop a plan to solve it. Then they use the strategy to find a solution. Lastly, they adjust and monitor if the solution makes sense. Scaffolding can be applied to have learners to think on hypotheses before they do it independently. McLeod (2019) highlighted teachers

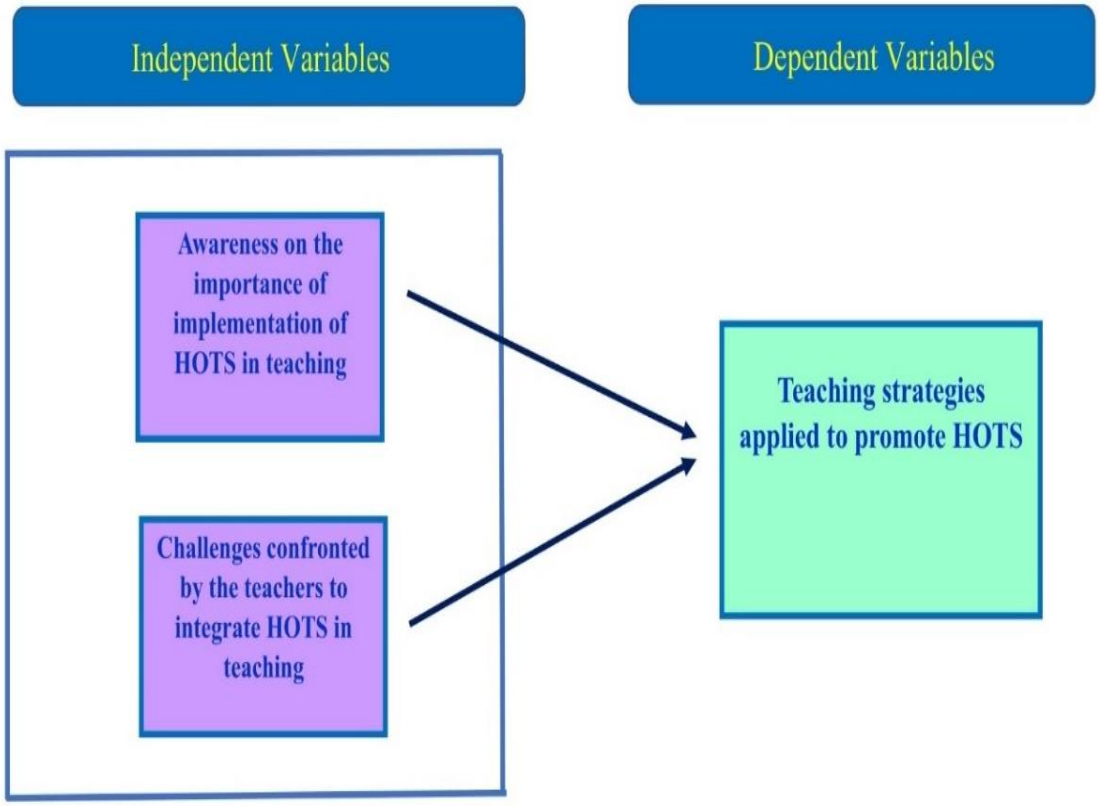
should act as a facilitator of learning rather than an instructor by guiding them in addressing the problems and motivating them to learn by their own in the activities. Vygotsky believed that knowledge is constructed internally via social interactions with more knowledgeable others (Eggen and Kauchak, 2016). Discussion among learners must conduct so that learners are encouraged to interact with each other by expressing their ideas as learning is dependent on learners' interactions with the environment and others. Social interaction facilitates learning as learning is transferred from one context to another. While discussing, students are providing examples or ideas, or solving a problem with each other and these are all examples of transfer of learning. Therefore, to promote transfer, teachers have to make the topics or contents as meaningful for students as possible. Teachers can provide students with examples and other experiences, make the content related to real-world situations and maximize the interactions as learning is a social process (Eggen and Kauchak, 2016). On the other hands, students can think about their own learning through discussion as metacognition occurs. They need to take notes while discussing so that they can regulate their cognition and remember better. In short, various of student-centered teaching strategies which enable teachers to create a collaborative problem solving and idea exploration learning environment in the class are able to encourage students to be actively participate in their own learning.

1.8 Conceptual Framework

Figure 1.1 below demonstrates the conceptual framework used in this research. The objectives of the research are to investigate two different relationships among three variables. The first relationship to be investigated is the relationship between the level of

awareness on the importance of implementation of HOTS in teaching and the frequency of teaching strategies applied in developing HOTS. The second relationship to be investigated is the relationship between the degree of challenges confronted by the teachers and the frequency of teaching strategies applied in developing HOTS.

Figure 1.1 The Conceptual Framework of the Research.



According to Jati et al. (2019), awareness is defined as 'knowing something exists and important'. People know, realize or interested in knowing about something, or, to know that something is important. For this research, awareness refers to knowledge or understanding on the importance of implementation of HOTS in teaching and interest in knowing about the application of HOTS in teaching.

The second independent variable is the challenges confronted by teachers in teaching HOTS. The challenges faced by the teachers in teaching for HOTS were in the aspects of teachers and also teaching and learning preparations and processes (Seman et al., 2017).

The dependent variable - teaching strategies refer to methods used to help students learn the desired course contents and be able to develop achievable goals in the lesson (Steve Armstrong, 2020). The researcher adapted an instrument entitled *'Promoting Higher Order Thinking Skills via Teaching Practices'* which was developed by Ganapathy et al. (2017) as in their research, they found that brainstorming activities and problem-solving activities are most frequently used teaching activities and other activities such as engaging students in oral presentation, activating students' prior knowledge or experience and creating an idea exploration environment in the class were identified too. The concept is similar and relevant to the researcher's study and thus it is adapted for this research purposes.

1.9 Significance of the Study

This research will be a significant endeavor in promoting primary school teachers to implement higher order thinking skills teaching strategies for the purpose of enhancing primary school students' higher order thinking skills. It is hoped that this study will assist primary school teachers to raise their awareness regarding the importance of application of various higher order thinking skills teaching strategies in class as it is necessary to equip the children with higher order thinking skills in this 21st century since the aspiration of Malaysian Education Blueprint 2013-2025 is to develop students who are master higher order thinking skills including critical thinking, reasoning, creative thinking and innovation (Seman et al., 2017).

Additionally, the result of the study will provide valuable resources on higher order thinking skills teaching strategies for primary teachers to improvise their teaching strategies as primary school level is the best time to promote and develop thinking skills as this level is considered as the basic foundation for further education (Seman et al., 2017). By promoting and implementing HOTS activities, students' thinking skills can be empowered as well as their academic performance.

Further, this study attempts to give an insight for teacher educators, curriculum developers, and those involved in planning, designing, implementing the development and innovations in education particularly higher order thinking skills teaching strategies in primary schools. The result of the study assists curriculum planners to examine the existing materials and provide appropriate examples for teachers to plan their lessons by incorporating higher order thinking skills in solving problems creatively, critically and logically.

Last but not least, this research will serve as a future reference for other researchers on the subject of higher order thinking skills and their teaching strategies.

1.10 Scope of the Study

This study focuses on higher order thinking skills teaching strategies implemented by primary school teachers specifically national Chinese-type primary school teachers. The level of awareness among primary school teachers on the importance of implementation of HOTS in teaching was investigated. Then, the degree of challenges confronted by the teachers was investigated and also the frequency of HOTS teaching strategies was identified. Moreover, the relationship between level of awareness and their frequency of HOTS teaching strategies applied was investigated. Finally, the relationship between the degree of challenges confronted by the teachers and the frequency of HOTS teaching strategies applied was examined. The challenges covered in this research are teacher's aspect and teaching and learning preparations and processes. Teacher's aspect covered limited knowledge and skills in integrating HOTS and teaching and learning preparations and processes included lack of opportunity to integrate HOTS, time constraint and having difficulty to change current teaching practice. The higher order thinking skills teaching strategies like activating prior knowledge of students, brainstorming activities, problem solving activities, oral presentation, and creating an idea exploration environment in the class were covered in this research.

This research involved 217 national Chinese-type primary school teachers in Kluang, Johor. To investigate the level of awareness, the degree of challenges confronted by the teachers, the frequency of HOTS teaching strategies applied and the relationships among the variables, a set of questionnaires was adapted from the instruments of *'Investigating Teachers' Implementation and Strategies on Higher Order Thinking Skills in School Based Assessment Instruments' (Wilson and Narasuman, 2020)* and '*Promoting Higher Order Thinking Skills via Teaching Practices' (Ganapathy et al., 2017).* The adapted questionnaire was created in Google Form which consisting of 28 items and the respondents have to rank their level of agreement based on the scale given. The data were analyzed statistically and the relationships among the variables were explored too.

1.11 Delimitations of the Study

This research was conducted based on quantitative research method. Participants answered a set of questionnaires via Google Form. There might be some respondents who did not give any responses regarding the survey form and sample size of the research would be affected.

The population selected for this study was national Chinese-type primary school teachers in Kluang, Johor. The result obtained may not be applicable to teachers outside of this designation as the findings of this research was only intended for primary school teachers mainly national Chinese-type primary school teachers in the district of Kluang, Johor.

Teachers' viewpoints and detailed data could be taken into account for this research. However, due to quantitative research method, the representation of multiple viewpoints could only be expressed by answering the questionnaire. Hence, the viewpoints were limited and only based on questions asked in the questionnaire.

1.12 Operational Definitions

1.12.1 Awareness on the Importance of Implementation of HOTS in Teaching

According to Jati et al. (2019), awareness is defined as 'knowing something exists and important'. People know, realize or interested in knowing about something, or, to know that something is important.

In this research, awareness refers to the knowledge or understanding on the importance of implementation of HOTS in teaching among SJK(C) teachers in the district of Kluang, Johor and their interest in knowing about the application of HOTS in teaching. The researcher categorized the level of awareness into three levels which are low, medium and high. A high level of awareness on the importance of implementation of HOTS in teaching among primary school teachers is vital as they are the persons who inculcate students' higher order thinking skills during their childhood.

1.12.2 Challenges Confronted by the Teachers in Teaching HOTS

Seman et al. (2017) defined the challenges confronted by the teachers in teaching for HOTS were in the aspects of teachers and also teaching and learning preparations and processes.

In this study, the focus of the challenge confronted by SJK(C) teachers for teacher's aspect is limited knowledge and skills in integrating HOTS. Another focus of the challenge is in teaching and learning preparations and processes such as lack of opportunity to integrate HOTS, time constraint and having difficulty to change current teaching practice.

1.12.3 Teaching Strategies of Higher Order Thinking Skills

Teaching strategies refer to methods used to help students learn the desired course contents and be able to develop achievable goals in the lesson (Steve Armstrong, 2020). This research focused on teaching strategies of higher order thinking skills such as activating prior knowledge/experience, brainstorming, problem solving, oral presentation, and creating an idea exploration environment in the class. Through these teaching strategies, hopefully, students' higher order thinking skills can be improved.

1.13 Summary

This chapter describes the main purpose of this research which is to investigate the relationship between the level of awareness on the importance of implementation of HOTS in teaching among primary school teachers and their frequency of HOTS teaching strategies applied. It also investigates the relationship between the degree of challenges confronted by the teachers and their frequency of HOTS teaching strategies applied. For this research, the frequency of HOTS teaching strategies applied serves as the dependent variable while level of awareness on the importance of implementation of HOTS in teaching among teachers and the degree of challenges confronted by the teachers are the independent variables. The findings of the study would provide valuable resources on higher order thinking skills teaching strategies for teachers to improvise their teaching strategies and also give an insight to the society about the challenges confronted by the teachers in developing higher order thinking skills. Curriculum planners or school administrators can examine the existing materials or situations and provide appropriate assistance and supports to the teachers.

REFERENCES

Abdullah, Abdul & Tahir, Lokman & Hamzah, Mohd Hilmi & S. Abd Rahman, Sharifah Nurarfah. (2019). Emerging patterns and problems of higher-order thinking skills (HOTS) mathematical problem-solving in the Form-three assessment (PT3). South African Journal of Education. 39. 1-18. 10.15700/saje.v39n2a1552.

Alavina, V. A. P. B. (2018, October 14). Tools and thinking in designing written tasks. The Learner's Toolbox. Retrieved from https://myptoolbox.com/2018/10/14/tools-\and-thinking-in-designing-written-tasks/

Alsowat, Hamad. (2016). An EFL Flipped Classroom Teaching Model: Effects on English Language Higher-order Thinking Skills, Student Engagement and Satisfaction. 7. 108-121.

Amabile, T. M. (1996). Creativity in context. Oxford: Westview Press.

Armstrong, S. (2020, January 18). The 10 most important teaching strategies. Innovate My School. Retrieved from https://www.innovatemyschool.com/ideas/the-10-most-powerful-teaching-strategies

Atiullah, K. (2019, July 25). *Using Revised Bloom's Taxonomy to Evaluate Higher Order Thinking Skills (Hots) in Reading Comprehension Questions of English Textbook for Year X of High School | English Education Journal*. English Education Journal. https://journal.unnes.ac.id/sju/index.php/eej/article/view/31794

Ballakrishnan, K., & Mohamad, M. (2020). Teachers' Teaching Methods in Teaching Higher Order Thinking Skill (Hots) Comprehension Questions. *International Journal of Academic Research in Business and Social Sciences*, *10*(2), 362–378.

Bloom's Taxonomy Revised. *The Peak Performance Center*. (2020, Oktober 22) [Image]. Retrieved from https://thepeakperformancecenter.com/educationallearning/thinking/blooms-taxonomy/blooms-taxonomy-revised/

Chich-Jen Shieh et al. (2017). A Study on the Application of Creative Problem-Solving Teaching to Statistics Teaching. EURASIA Journal of Mathematics Science and Technology Education. ISSN: 1305-8223 (online) 2017 13(7):3139-3149. Retrieved from https://www.ejmste.com/download/a-study-on-the-application-of-creative-problem-solving-teaching-to-statistics-teaching-4819.pdf

Complex Cognitive Processes: Definition & Examples. (2016, June 30). Retrieved from https://study.com/academy/lesson/complex-cognitive-processes-definition-examples.html.

Djami, Christian & Kuswandono, Paulus. (2020). Teachers' Strategies to Implement Higher-Order Thinking Skills in English Instruction. Metathesis: Journal of English Language, Literature, and Teaching.4.25.10.31002/metathesis. v4i1.2048.

E. Bruce Goldstein. (2018). Cognitive Psychology: Connecting Mind, Research, and Everyday Experience. 5th edition. Singapore: Cengage Learning Asia Pte Ltd.

Eckhoff, A., & Urbach, J. (2008). Understanding imaginative thinking during childhood: Sociocultural conceptions of creativity and imaginative thought. Early Childhood Education Journal, 36 (2), 179-185.

Eggen, P., & Kauchak, D. (2016). Educational Psychology: Windows on Classrooms, Global Edition (10th ed.). Pearson.

Eunsook T. Koh, Willis L. Owen. (2000). Descriptive Research and Qualitative Research. Retrieved from https://link.springer.com/chapter/10.1007%2F978-1-4615-1401-5_12

Ganapathy et al., (2017). Promoting Higher Order Thinking Skills via Teaching Practices. 3L: Language, Linguistics, Literature® The Southeast Asian Journal of English Language Studies.

Indriyana, Bernadeta & Kuswandono, Paulus. (2019). Developing Students Higher Order Thinking Skills (HOTS) in Reading: English Teachers Strategies in Selected Junior High Schools. JET (Journal of English Teaching). 5. 204. 10.33541/jet. v5i3.1313.

Ismail, H., Manaf, U.K., & Said, R.R. (2017). Teachers' Levels of Knowledge and Interest on Higher Order Thinking Skills (HOTS) According to the Field Taught and Category of Schools.

John W. Creswell-Research Design_ Qualitative, Quantitative, and Mixed Methods Approaches-SAGE Publications, Inc (2014) Retrieved from http://anyflip.com/uzbr/ftps/basic/201-250

Karim, Faziah & Tan, Jun. (2018). Readiness in Applying Higher Order Thinking Skills after Attending Courses. Journal of Techno Social. 10. 10.30880/jts.2018.10.02.006.

Kaur, Charanjit & Swaran Singh, Charanjit & Singh, Tarsame & Singh, Masa & Ja'afar, Hasimah & Ong, Eng & Kaur, Harsharan & Mostafa, Nor & Yunus, Md. (2020). Teaching Strategies to Develop Higher Order Thinking Skills in English Literature. 2020.

Kim, K. (2009). Flexible environment and creativity: A preliminary case study of interdisciplinary student design teams. Proceedings of the International ACM SIGCHI Conference on Supporting Team Work, Sanibel Island, FL, USA, May 10 - 13, 2009.

McLeod, S. A. (2019, July 17). Constructivism as a theory for teaching and learning. Simply Psychology. Retrieved from https://www.simplypsychology.org/constructivism.html

Millar, G.W. (1997). E. Paul Torrance - "The Creativity Man". Ablex Publishing, NJ. Retrieved from https://www.scielo.br/scielo.php?pid=S010174382010000200009&script=sci_arttext&tlng=en

Online, T. S. (2021, April 28). Education Minister: UPSR exams to be abolished; PT3 is cancelled this year. The Star. Retrieved from https://www.thestar.com.my/news/nation/2021/04/28/education-minister- upsr-exams-to-be-abolished-pt3-is-cancelled-this-year

Pimentel, Jonald. (2019). Some Biases in Likert Scaling Usage and its Correction. International Journal of Sciences: Basic and Applied Research (IJSBAR). 45.183-191. Retrieved from https://www.researchgate.net/publication/332533000_Some_Biases_in_Likert_Scaling_Usage_and_its_Correction

Radvansky, G.A., & Ashcraft, M.H. (2014). *Cognition* (6th ed.) Upper Saddle River, NJ: Pearson.

Rahman, S. A., & Manaf, N. F. A. (2017). A Critical Analysis of Bloom's Taxonomy in Teaching Creative and Critical Thinking Skills in Malaysia through English Literature. *English Language Teaching*, *10*(9), 245. Retrieved from https://doi.org/10.5539/elt.v10n9p245

Ratnasari, D., Nazir, F., Toresano, L. O. H. Z., & Soejoko, D. S. (2019, August 13). The correlation between effective renal plasma flow (ERPF) and glomerular filtration rate (GFR) with renal scintigraphy 99m Tc-DTPA study. ResearchGate. Retrieved from https://www.researchgate.net/figure/Meaning-of-Pearson-correlation-coefficient-value-r_tbl1_299402589

Retnawati, Heri & Djidu, Hasan & Kartianom, Kartianom & Apino, Ezi & Anazifa, R.D. (2018). Teachers' knowledge about higher-order thinking skills and its learning strategy. Problems of Education in the 21st Century. 76. 215-230.

Row, Bavani Nageswana; Subramaniam, Selvaranee; V. Sathasivam, Renuka. When Students Say “I Just Couldn’t Think”: Challenges in Teaching Skilful Thinking. MOJES: Malaysian Online Journal of Educational Sciences, [S.l.], v. 4, n. 2, p. 59-69, July 2018. ISSN 2289-3024. Retrieved from https://mojes.um.edu.my/article/view/12650

Ruey-Shyy Shieh & Wheijen Chang. (2014). Fostering Student’s Creative and Problem-Solving Skills Through A Hands-on Activity. Journal of Baltic Science Education, Vol. 13, No. 5, 2014. ISSN:1648-3898. Retrieved from http://www.scientiasocialis.lt/jbse/files/pdf/vol13/650661.Shieh_JBSE_Vol.13_No.5.pdf

Seman, Shamilati & Wan Yusoff, Wan Mazwati & Embong, Rahimah. (2017). Teachers Challenges in Teaching and Learning for Higher Order Thinking Skills (HOTS) in Primary School. International Journal of Asian Social Science. 7. 534-545. 10.18488/journal.1.2017.77.534.545.

Shukla, Divya. (2016). Student’s Perceived Level and Teachers’ Teaching Strategies of Higher Order Thinking Skills; A Study on Higher Educational Institutions in Thailand. 7.

Siraj, S., & Nordin, A.B. (2015). Teaching Strategies Scale for Promoting Higher Order Thinking Skills among Students in Science. Retrieved from https://pdfs.semanticscholar.org/fce9/b169cda1ffdbc97dd53c15c4de66c00b1c31.pdf

Taherdoost, Hamed. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. International Journal of Academic Research in Management. 5. 18-27. 10.2139/ssrn.3205035.

Wilson, Diana & Narasuman, Suthagar. (2020). Investigating Teachers' Implementation and Strategies on Higher Order Thinking Skills in School Based Assessment Instruments. Asian Journal of University Education. 16. 70. 10.24191/ajue. v16i1.8991.

Yee, Heong & Othman, Widad & Yunos, Jailani & Tee, Tze & Hassan, Razali & Mohaffyza, Mimi. (2011). The Level of Marzano Higher Order Thinking Skills among Technical Education Students. International Journal of Social Science and Humanity. 1. 121-125. 10.7763/IJSSH. 2011.V1.20.

Yusoff, W. M. W., & Seman, S. C. (2018). Teachers' Knowledge of Higher Order Thinking and Questioning Skills: A Case Study at a Primary School in Terengganu, Malaysia. *International Journal of Academic Research in Progressive Education and Development*, *7*(2), 45–63.