

## Perceptions of Mathematics Teachers in Higher Order Thinking Skills (HOTS) in Kuala Langat District Secondary School

Mazlini Adnan, Mohd Faizal Nizam Lee Abdullah, Che Nidzam Che Ahmad,  
Najah Mohd Nawi and Suhaini Ismail  
Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris,  
Tanjung Malim, Malaysia

**Abstract:** The aim of the study is to determine, the perception of Mathematics teachers on the implementation of Higher Order Thinking Skills (HOTS) in secondary school of Kuala Langat District, Banting. Besides, the study also aims to determine the mathematics teacher's knowledge about HOTS and implementation of HOTS in classroom. The respondents were 50 secondary school mathematics teachers who were chosen randomly. Data collected in this study will be analyzed, descriptively involving the calculation of frequency, percentage, mean and standard deviation. In addition to that inferential statistics will be used to analyze the strength of the relationship between two variables in each hypothesis by using Pearson correlation and t-test analysis. The study found that, the Mathematics teachers in secondary school have a positive feedback on the implementation of HOTS in the school and the implementation of HOTS is high. Analysis of the hypothesis showed a significant relationship between the knowledge of HOTS and the implementation of HOTS in teaching and learning (T&L). Meanwhile, there was no difference between HOTS, knowledge and practice of T&L with teaching experience. In conclusion, it is clear that the perception of mathematics teachers on the implementation of HOTS is very good.

**Key words:** HOTS, Mathematics teacher, perception, implementation, frequency, knowledge

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### INTRODUCTION

Higher Order Thinking Skills (HOTS) is one of the primary components in the skills of thinking creatively and critically and it is the highest stages in cognitive process hierarchy. HOTS happens when an individual getting a new information, store, arranging as well as finding the relation between the existing knowledge and extending the information to fulfill the objectives and solving complex situation.

In the field of mathematics education, reforms have been carried out. This change was made in the preparation of evaluating students in terms of reasoning, creative and critical thinking skills, the ability to master and apply knowledge and mathematical concepts to solve problems, the ability to describe and explain mathematical ideas in the form of oral, written and visual (Akan, 2003). The students should be prepared to face all the changes made in parallel with the development of global education system for students is going to compete with the outside community in effort to put Malaysia on par with developed countries to another. Thinking is always associated with the process of problem solving in Math class. Mathematical problem solving abilities depending

on the level of a student's thinking. Learning mathematics patterned emphasized the development of student's thinking with problem solving skills involving problem solving process. A student through the problem solving process is able to understand a problem, design a solution to resolve the issue and be able to connect it with the knowledge and experience that has been passed by the previous.

HOTS is a critical thinking that has been recommended by experts objectivist and constructivist. If a high level of proficiency in math class is encouraged and can be applied effectively in the country's education system, greater insight can be realized. Critical thinking also can encourage someone in subsequent intellectual development and could helps to put in the globalization trend now a days. Hence, this study aims to answer the following research questions:

- What are the perceptions of mathematics teachers on the level of knowledge about HOTS?
- What are the perceptions of mathematics teachers towards HOTS practice in teaching and learning (T&L)?

- There a significant relationship between the level of HOTS 'knowledge with HOTS' practices in T&L?
- There a significant difference between level of HOTS 'knowledge with teaching experience'?
- There a difference between mathematics teachers 'perception towards T&L and teaching experience'?

## MATERIALS AND METHODS

The design of the research aims to answer the specific questions posed by the research problem identified. Therefore, the study design should be appropriate to the problem so that the explanation given in this research can reassure the reader without causing confusion. The study is the design of quantitative surveys conducted using descriptive methods. According to quantitative research is a kind of educational research where researchers decide what you want to study, ask questions that are specific, narrow the scope of the questions, collecting data that can be quantified from the participants, analyze those numbers using statistics and carry out the inquiry in objective form and unbiased.

**Participants of the study:** The study involved 50 mathematic teachers from secondary school in Kuala Langat District. The sample was selected randomly. Instructions and questionnaire is standardized and similar to all respondents to be surveyed.

**Research instrument:** The instrument used in this study is a set of questionnaires. The questionnaire consisted of three parts, namely Part a-c.

Part A is related to demographic information, which contains 10 items. While part B and C of the questionnaire using Likert scale format 5 scale consists of 30 items covering the aspects to be studied and aspects of knowledge about HOTS and HOTS 'T&L practices.

## RESULTS AND DISCUSSION

**Profile of respondents:** Respondents consist of 14 people or 28% of men and 36 or 78% women. Respondents were teachers graded the post of DG 32 of 18 people or 36%, DG 34, a total of 8 people or 16%, DG 41 of 21 people or 42%, DG 44 of 2 or 4% and DG 48 per person, i.e., 2%. Of the survey conducted found that the percentage of respondent's experience of teaching mathematics to <5 years is 44% of 22 respondents. Meanwhile, the percentage of experience teaching mathematics >5 years is 56% of 28 respondents.

**Perceptions of mathematics teachers on the level of knowledge about HOTS?:** Mathematics teachers in

secondary schools in Kuala Langat District has a high level of agreement that the knowledge of HOTS are very important in the teaching of mathematics. The results of this study coincides with a study conducted by Friedman an educator must prepare students for all levels of education and employment where people are required to think about the information available and appropriate is always changing. In addition, the study also showed that mathematics teachers of secondary schools in Kuala Langat District know and understand how to implement the 8 types of thinking maps (i-THINK) at a high level with the mean value of 3.92. The findings are supported by Gallavan and Kottler which states that the use of 8 thinking maps are specific graphics stacks capable of arranging the student's thinking. David Hyerly states that by using 8 thinking maps will encourage metacognition and cognitive development for students continuously throughout their academic careers and add one component of art and kinesthetic for students effectively by certain intelligence level.

Teachers of secondary school mathematics Kuala Langat District also has a good perception towards the teacher's knowledge of the concept of HOTS with a mean value of 3.90. There are a handful of mathematics teachers lack knowledge about the concept of HOTS. The findings of this study in conjunction with Bakry and Bskar (2013) found that there are still some high school mathematics teachers in Makassar do not know about HOTS. The findings were drawn from interviews with the mathematics teachers which it is appears that almost all mathematics teachers assume that HOTS skills can be built in T&L activities. In addition, the study found that teachers still believes that additional programs in each study may also help in improving the thinking skills.

**Perceptions of mathematics teacher towards HOTS 'teaching and learning practice:** From the analysis conducted, it was found that the teachers put more priority on teaching HOTS rather than finishing syllabus by simply giving the mean value, 3.44. This finding contrasts with Hashim and Suhailah (2003) which found that teachers did HOTS generally. This is probably because the teachers are not familiar with the processes and skills. Teachers may also not have much time to focus on teaching thinking skills because they probably more focus on finishing the course and prepare students for public examinations. Rajendran (2008) suggest this may be due to less confident teachers to teach HOTS. Rajendran study shows that teachers of Bahasa Melayu and English were less confident of their pedagogy to teach HOTS. Supramani (2006) states that all teachers have the question of the High Level Convergence (HLC) in T&L. By using more challenging high level questions, students

Table 1: Pearson correlation test for mathematics teacher's perception of knowledge about HOTS with HOT's teaching and learning practices

Relationship between variables	r	p-value	Result
Perception about knowledge T&L practices	0.512	0.000	Rejected

Table 2: T-test for mathematics teachers perception of knowledge about HOTS with experience teaching mathematics

Teaching experience (years)	Mean	SD	t-value	Sig.
<5	3.55	0.55	-0.864	0.893
>5	3.46	3.46		

Table 3: T-test for mathematics teacher's perceptions of HOT's T&L practices with experience teaching mathematics

Teaching experience (years)	Mean	SD	t-value	Sig.
<5	3.27	0.77	0.560	0.180
>5	3.43	0.50		

p<0.05

will be encouraged to express opinions to discuss their findings to find a solution to a problem and generate new ideas on matters relating to the content of the lessons. This method involves the students in critical and creative thinking.

**Relationship between knowledge about higher order thinking skills and higher order thinking skills teaching practice:** Based on Pearson r correlation test (Table 1), it is found that the coefficient value,  $r = 0.512$  and  $p = 0.000$ . This result explains, a significant relationship between mathematics teacher's perception of knowledge about HOTS with HOTS T&L practices. However, it can be omitted due to low correlation value. Therefore, the null hypothesis is rejected.

**The difference between knowledge on higher order thinking skills and teaching experience:** Based on Table 2 founds, the test  $t = -0.864$ ,  $p = 0.893$  is not significant at  $p > 0.05$ , thus confirming the hypothesis of no difference frequency score of the HOTS knowledge by teaching mathematics, failed to be rejected. This means that there is sufficient evidence to indicate there is a difference in perception of mathematics teachers with knowledge about HOTS with experience teaching mathematics.

**Differences between practice of teaching and learning in higher order thinking skills with teaching experience:** Table 3 shows that the test  $t = 0.560$ ,  $p = 0.180$  is not significant at  $p > 0.05$ . The statement said the hypothesis that there is no difference frequency score HOTS teaching and learning by experience teaching mathematics, failed to

and learning by experience teaching mathematics, failed to indicate there is a difference in perception of mathematics teachers towards HOTS T&L practices with experience teaching mathematics.

## CONCLUSION

In conclusion, this study is expected to provide awareness to the mathematics teachers about the need of knowledge and HOTS practice in mathematics T&L. The results showed that the level of knowledge and HOTS practice in T&L is high. However, further action is needed to improve some elements in HOTS in mathematics T&L. Hopefully the information from the results of this study can serve as a guide and reference to the parties involved such as the Ministry of Education (MOE) in tackling problems arising in the schools during the teaching of HOTS. Mathematics teacher's attitudes and beliefs can be enhanced with the support and cooperation particularly from the school administration and the MOE.

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