EXPLORING TEACHERS’ ON INTEGRATING HOTS ELEMENT IN TEACHING AND LEARNING PROCESS

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ABSTRACT
Integration of higher order thinking skills (HOTS) in the classroom play an important role as it is the needs of the 21st century educational challenges. HOTS is also used in teaching and learning process to shape a dynamic and balanced generation in all aspects of life. However, various challenges and obstacles exists in the effective integration of HOTS in the classroom, especially for mathematics subjects. Therefore, this study was conducted to explore the implementation of higher order thinking skills during teaching and learning process. This study is a qualitative study. Data were collected through interview. Two teachers who are teaching Mathematics for primary school students were selected to become respondent of this study. The sampling method used was purposive sampling. Finding shows that teachers’ understanding about HOTS is at moderate level. Moreover, teachers are willing to accept the transformation of educational curriculum which emphasis HOTS during the teaching and learning process. In addition, teachers face difficulty to integrate HOTS in teaching and learning process because lack exposure on the HOTS pedagogy.

Key Words: Higher Order Thinking Skills (HOTS), Teachers’ Opinion, Teaching and Learning process

INTRODUCTION
Development of a country is depends on the potential of its people (Kamrin & Noordin, 2008). The strength of a nation is based on the level of knowledge and skills mastered by the people of the country. Education is one of the aspect that contribute to the national development. Students from all the education institute such as primary and secondary schools, no matter public or private sectors are the target group that contribute to the development of the country (Rashid 2016). Under the rubric of Vision 2020, Malaysians should have the knowledge and skills to compete themselves with other developed countries. Various efforts have been taken by the Ministry of Education (MOE) to improve and enhance the education system in Malaysia. As our education system focus in 21st century skills, MOE has emphasized the Higher Order Thinking Skills (HOTS) in the curriculum as it may help the students to promote and develop the intellectual skills. In order to produce students with HOTS and achieve the goals of vision 2020, the role of education is found to be very large.

According to Pithers, & Soden (2016), employers have argued that all the education sectors have the responsibility to prepare individuals who are able to think well and think for themselves. Thinking well or good thinking is usually related to ‘critical thinking’. Even though the education curriculum and system itself is a highly competitive arena for students, yet the students need to be guided to think well and to think for themselves. Scholars who are related to educational system emphasize that the important objective of higher educational institutions is to develop and produce graduates who can think critically (Mehta, 2015). Critical thinking is a systematic thinking and it is related to few cognitive skills such as analysis, interpretation, inference and self-regulation (Kamrin & Noordin, 2008; Pithers & Soden, 2016). It helps and individual to enhance the chances of better decisions, solutions and judgement through specific and purposeful evaluation of thoughts. Critical thinking is usually used to describe abilities of students which are related to teaching and learning context. Fahim, & Eslamdoost (2014) stated that since 1960s, critical thinking has become the focus of attention and tracked by the educators. Critical thinking involves the logical reasoning, the ability to separate facts from opinion, and ability on and individual to questioning things before accepting them.

In order to produce students with HOTS to achieve the goals of 2020, the role of a teacher is found to be very large (Ali & Noordin, 2010). Teacher is the individual which can lead the students to enhance HOTS. Jabar (2006) stated that the teacher must develop intellectual potential of students with emphasizing the thinking skills during the teaching and learning process in the classroom. Emphasizing on the mastery of facts alone doesn’t enough without engaging it to the thinking skills. Teacher must train the students, so they are able to assess from various points of view and make the learning to be more meaningful.

In the process of learning, especially in Mathematics, teachers are the individual who responsible for applying and exposing the students to a variety of approaches that stimulate their thinking. Kitot, Ahmad & Seman (2010)
believe that the student’s ability and performance in the subject can be improved by proactive method in teaching and learning which carried out in schools. Therefore, teachers should have the knowledge and skill of subjects and broad understanding of students learning. Teachers should also highly motivate and confident on their ability to be a positive impact on their teaching. This shows that the teachers should have knowledge of HOTS and integrate the skills during teaching and learning process in order to encourage students to describe the idea in the solution of a problem besides guiding them to improve HOTS. Knowledge of basic Mathematical concepts and facts should be emphasized since from primary school so that the students can be trained to think since from primary school.

LITERATURE REVIEW

The education system of Malaysia focuses to produce more individuals who are knowledgeable in many areas and able to think critically. According to Malaysian Education Development Plan (2013 – 2015), the transformation of the educational curriculum places great emphasis on the concept of higher order thinking skills (HOTS). Higher order thinking skills is capable to produce a generation which has the ability in critical and creative thinking. This approach was introduced to achieve the ultimate goal of education which focused to produce more students who have a high level of cognitive ability through teaching and learning process. In 2011, HOTS had launched a review on all KSSR and KSSM subjects. In this review, HOTS that emphasize in the education curriculum is an advanced exercise of critical and creative thinking skills which was implemented in 1993 (Othman & Kassim, 2013).

Critical, logical, reflective, metacognitive and creative thinking are related to higher order thinking skills. HOTS encourage the individual to think critically when an individual encounter unfamiliar problems and questions, dilemmas or uncertainties. Individuals who dominate HOTS are able to organizing use the existing knowledge to organize their thoughts on the ability to describe, interpret, create, reflect and correlate with the current situation. According to Newmann (1990), HOTS can be defined as a thinking process of an individual who need to widely interpret, analyse or manipulate the existing knowledge to answer a question. King, Goodson & Rohani (1998) stated that higher order thinking skills are grounded with lower order skills.

A lower order thinking skills represent the ability such as simple application and analysis, discrimination and cognitive strategies. There are linked to prior knowledge of subject matter content. Although there are researchers and theoreticians who use to describe the higher order thinking skills by different framework, yet the entire framework is in common agreement and it is concerning the conditions under which they prosper. However, HOTS in this study is defined as the top three levels of thinking skills which found in revised Bloom’s Taxonomy by Anderson & Krathwohl (2001). The thinking skills are analyse, evaluate and create. However, HOTS in Malaysia is based on Bloom’s Taxonomy and modified by Lorin Anderson which Zinvolves four of top hierarchy; applying, analysing, evaluate and create (Kassim & Zakaria, 2015; Othman & Kassim, 2013).

According to Malaysian Education Development Plan (2013 – 2015), each student is exposed to have thinking skills, leadership skills, bilingual skills, knowledge, ethics and spirituality and national identity (Rashid 2016). Unfortunately, all these skills are not produced easily because it needs to be nurtured systematically. Variety of approaches have been introduced by the education system of Malaysia to produced students that are intelligent, creative and innovative to meet the challenges of the 21st century so that the country can produce students who can compete with other develop country. HOTS requires an individual to do something about the information, facts and ideas received by giving meaning, finding the connection between the information gathered, categorize and manipulate the information so that it will lead to find a new meaning and understanding.

Eileen Christina (2011) stated that the teaching and learning process that promotes higher order thinking skills are carried out with a specific group of students only. Teacher used higher order thinking skills task only for excellent students only. They believe that the task that required students for higher order thinking skills were difficult for lower ability students. This type of task would be too frustrating and difficult for lower ability students to be solved. During the answering section especially answering questions at a high level, the lower ability students are neglected because they couldn’t answer the questions (Rashid 2016). Coffman (2013) stated that the teacher’s believe on promoting higher order thinking skills to students may be influenced by few factors such as student’s demography, socioeconomic status, special education status and so forth.

During the teaching and learning process, teachers supposed to emphasize the thinking skills to ensure that the students are able to understand the HOTS. Unfortunately, teachers are not emphasizing the thinking skills during the learning process in the classroom. Sukiman (2012) and Zamri Mahamod & Nor Razah Lim (2011) found that the practice of HOTS in the classroom is less among the teachers. During the teaching process, teachers found to be less familiar at the questioning techniques in the classroom. Teachers use more traditional method of
teaching which the learning process is based on teachers centred only. Traditional method such as lecturing method is used by teachers to provide the information only and as the result, the students will become more passive by just listening the explanation from teachers only. The lack of students’ involvement in the process of teaching and learning process especially by Mathematics teachers will lead to the failure of students thinking skills (Mahamod & Lim, 2011).

According to (Nor Jannah Hassan, Kassim, Safani Bari, Effandi Zakaria, & Norshidah Mohamad, 2015), knowledge of teachers regarding on implementation of HOTS activity in the classroom is limited to eight maps of thinking and questioning technique. Moreover, teachers ask question based on lower level questions which mainly emphasis on factual information only. Albergaria-almeida (2010) found that teachers are used to post questions which are low-cognitive level questions. In addition, even the teacher asks few numbers of questions during the learning process, the questions are based on a same category only. Questioning skills such as encouraging students to think, developing students reflecting skills and stimulate students to ask questions of their own are seldom used by the teachers (Albergaria-almeida, 2010). From elementary teaching to university and in a variety of subjects’ area, teachers used to post questions which not promoting to HOTS skill. Therefore, lack of teacher’s knowledge regarding on implementation of HOTS activity is one of the factor that affect the willingness of teacher in the success of this agenda.

In addition, most of the teachers are emphasizing the drill and practice for better understanding in Mathematics. Mohd Syaubari Bin Othman (2013) stated that the use of teaching aids in the beginning of a subject by teachers in schools is moderate due to the method of teaching is focuses only explanation and drill and practice for a better understanding. Teachers are more concern with teaching concepts and facts in Mathematics. Students are exposed that learning Mathematics requires memorization of formulas and the law of Mathematics terms. In addition, most teachers are giving less stress on understanding the Mathematical concepts due to finish the syllabus quickly and focus on the public examination. Teachers are desired to produce students who may get an A in the subjects taught.

Therefore, teachers are not interested in adopting HOTS activity during the teaching and learning process (Ns Rajendran, 2001). Jailani Bin Md Yunos, Tee Tze Kiong, Yee Mei Heong, Atan Bin Hussein (2010) stated that most of the students are thought to memorize and priority given to earned excellent grades only. But unfortunately, these types of students are unable to complete the assigned task properly because the students become passive recipient of knowledge and the majority of them do not have higher order thinking. It seems to be difficult for students to understand concept especially mathematical concepts. Some of the factors such as lack of time to plan mathematical activities, difficulty on determine the appropriate method of teaching higher order thinking skills and less motivation and confident level of teachers lead to the lack of implementation of HOTS skills in the classroom (Yunos et al., 2010).

Since year 2013, implementation of teaching HOTS in Mathematics and Science has been discussed by the MOE. Based on the literature review, teachers are the agent that plays a major role in the enforcement of changes in the education system. Therefore, the general aim of this article is to find out the teacher’s opinion on higher order thinking skills (HOTS). Issues that related to teachers knowledge regarding on concept of higher order thinking skills are also discussed in this article. Moreover, issues such as difficulties of teaching Mathematics which involves HOTS are also covered in this article.

METHODOLOGY

This study adopted a qualitative methodology and case study design. The primary source of data was interview section carried out by the researcher. Semi-structured interviews were design because this is the early stage of exploring the research domain. These questions were develop based on the guidelines of Bernard (2000) and validated by two experts. The research questions are:

1. What is your opinion on HOTS?
2. What are the difficulties on teaching HOTS to students especially on Mathematics lesson?
3. Audio recording equipment was used during the interview section with the permission of respondent. Jasmi (2012) stated that qualitative research is not concern about the number of respondent but it gives the important to the information that we gathered from the study that provides a better understanding of the aspects studied. Purposive sampling method is used to select the respondent which suits to the objective of study. Therefore, this study involves two respondents who are teachers from a primary school at Ampang, Selangor. Both respondents are teachers who are teaching mathematics for lower and upper primary and have different years of
experience in teaching maths. Both of these teachers are teachers with expertise in mathematics. They were also given exposure on HOTS through the i-THINK program in year 2014. The profile of respondents is shown in Table 1.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Years of teaching experiences</th>
<th>Teaching Maths classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10 years</td>
<td>Year 2, Year 5</td>
</tr>
<tr>
<td>B</td>
<td>6 years</td>
<td>Year 1, Year 4 and Year 6</td>
</tr>
</tbody>
</table>

RESULT

Opinion of HOTS among the teachers

The concept of HOTS is the main focus of education when MOE introduced the Malaysian Education Development Plan (2013 - 2025). Teaching objectives are sets based on the Revised Bloom’s Taxonomy. Thinking skills are fundamental to the educational process. Teachers must have a better understanding and knowledge regarding HOTS in order to teach higher-order thinking skills and implement the skills during the teaching and learning process. Based on the study, it is found that teachers have various opinions regarding on the HOTS.

Respondent A

“…..HOTS is not something new in our education system. Previously it is known as Kemahiran Berfikir Kritis dan Kreatif (KBKK). Students need to solve problem using creative and critical thinking. And same goes to HOTS which are related to problem solving in mathematics. Students must think out of the box to solve non-routine problem. HOTS questions require students to implement few thinking skills to solve the problem. Usually, I will use the questions from various sources which need HOTS to train the students thinking skills. I tried to drill and practice the HOTS questions so that the students have better understanding of the questions”.

Respondent B

“…..To be honest, I feel that HOTS is a thinking skill that requires students to solve a problem by using more than a method. Basically concept of mathematic is important to enhance students thinking skills. So, I myself have to prepare well with HOTS question before enter the class. I have to prepare with some technique to guide the students. Usually I will use i-Think map as a tool to recall back the concept before discuss HOTS question. Sometimes I will relate the questions to the real life situation by using the easiest example (related to their daily life) for a better understanding of concept. I personally feel that students must have a better understanding of a mathematic concept to ensure themselves can handle the HOTS questions”.

Difficulties of teaching HOTS

Problems faced by the teachers need to be addressed so that the implementation of HOTS in teaching and learning process become more successful. Based on the study, it is found that the respondent have few difficulties during integrating HOTS activity in the classroom. Both respondents feel that various cognitive levels of student is the main problem that they encountered during the HOTS activity. Respondents A stated that

“…..There are few categories of students in a classroom. So I really feel difficult to carry out or explain HOTS activity and questions. Some students are really good and we just need to explain the question and they can solve the question. But some students are really poor. They don’t even remember the basic concept. So I have to guide them one by one and I couldn’t complete the activity by end of the period”. Respondent B stated that “…..Time and syllabus are is the main factors that affect the implementation of HOTS in the classroom. I am a maths teacher for year 1 and year 6. For year 1, LINUS is one of the important programs which emphasize the students to be master the basic numeracy skills. There are 42 students in year 1 and I used most of the time to teach the basic skills only. I also have to pay attention to weak students to ensure that they are able to understand the basic numeracy skills. So, I don’t have enough time to emphasis HOTS among the students. Same goes to year six students. I have to complete the entire syllabus before end of month June, so I can prepare the students for trial examination. I just do some drill and practice only on HOTS question.”
Moreover, respondent stated that they need a proper module to carry out the HOTS activity during the teaching and learning process. Respondent B stated that

“We don’t have a proper module and guidelines to teach HOTS skills for students. Most of the time, I just carried out the activity from text book or activity book. A proper module is really useful for teacher as it can be reference. SJKT schools are learning maths in Tamil language. So again we face the difficulties to find exercise book for students to enhance the HOTS skills. The resources are limited and we don’t have much exercise book in Tamil language. Most of the exercise books are in Malay and English language and students from year 6 need more exercise book in Tamil Language to be practice. The language becomes a barrier for students to access HOTS resources”. In addition, respondent A said that teachers must be exposed to courses that related to implementing HOTS skills in Mathematic. LADAP is given to all teachers to expose the concept of HOTS only. But unfortunately teachers are lack of idea in creating HOTS activity. Therefore, teachers must be given exposure every time with the new idea of HOTS activity so that they may apply it in the classroom during the maths lesson. Even though there are many activities found in internet, yet teachers have less idea on how to adapt the activity and modify it according to the students’ level.

DISCUSSION

According to the data from this study, it is found that teachers have understand the students level of cognitive level in order to help and guide the students towards more sophisticated conception of mathematics. Eileen Christina (2011) stated that the teachers must focus on the understanding of mathematics in order to help them to create and carry out an effective lesson. By having a better understanding of mathematics, teachers are able to focus on students’ conceptual understanding and thinking skills in order to facilitate higher order thinking. Based on the study, it is proven that the teachers have assumed that the problem solving is the main agenda and it must be used in teaching and learning mathematics as HOTS activity. King et al. (1998) stated that the process of problem solving requires the students to find “a series of successive decisions. Unfortunately, HOTS doesn’t focus on problem solving skills only. Many educators and researchers assume that higher order thinking can be implementing through the learning process by giving complex questions to the learners (Abosalem, 2016). Complexity might be one of the element that helps students in higher order skills, yet it is not the only element.

Based on the responses, teachers are using drill and practice as a tool to enhance the HOTS among the students. Even though drill and practice is one of the essential way that used in teaching and learning process, yet this is one of the is one of the traditional method that used by teachers to prepare the students for school based exam or national exam. According to Kitot et al. (2010), the method that used by teachers in teaching and learning process has given an impact on students learning process and the development of a concept. The students are able to answer and produce satisfactory result by memorizing all the formulas (Isa, 2012).

As a result, students are unable to apply the outcome in their daily life. Drill and practice process lead to more mental operation that are repeated and does not require more complex of thinking process among the students (S. Supramani, 2006). This thinking process doesn’t produce anything new or creative and it refers to lower order thinking (Newmann, 1990). Various thinking process such as interpret, analyse or manipulate the existing information and knowledge to answer a question or solve a problem must be used by the teacher in order to implement the HOTS among the students. Teacher must encourage the students to find few possible solutions for a problem. Later, students must be given some task to create some situations or question based on the knowledge gain from the problem solving which involve the higher order thinking process.

Abosalem (2016) stated that teacher must use various strategies to improve and develop student’s higher order thinking skills. Modelling of thinking skills, examples of applied thinking and other suitable activity should be included in lesson plan to help students develop higher order learning skills. Using a specific tool of teaching such as i-Think map can encourage the students to think more critically. Teacher much use diversity in the pedagogy skills in the class as it helps themselves to increases knowledge, to be more confident in teaching and able to deliver the current knowledge to students (Kitot et al., 2010). Some of the teaching methods are not really helpful for students to raise their achievement in academic due to the variety of students learning style (Rohaila, Norasmah, Faridah, Pendidikan, & Pengalaman, 2005). Teachers with less pedagogical skills are unable to carry out interesting activities and will further complicate the teaching process (Kitot et al., 2010). Knowledge of teacher regarding on pedagogical skill must be updated as it influence students thinking skills (Nor Jamnah Hassan et al., 2015).

In terms of implementation of HOTS activity, teachers have same opinion. Teachers feel that they should be given more exposure regarding on creating HOTS activity. According to Rajendran (2001), teachers are highly
motivated and confident about their pedagogical skills to teach subject compared to pedagogical skills to teach HOTS. In addition, the courses that were attended by the teachers are not really helpful from themselves. The outcome of the courses were not able to provide knowledge, skills and attitude of effective pedagogy to teachers to teach HOTS for the students (Ns Rajendran, 2001). Even though there are many courses organised by educational department, but the ‘sit and get’ type of courses certainly doesn’t make any changes among the teachers (Kassim & Zakaria, 2015; N Rajendran, 2001).

Teachers should be engage with hands on activity during the courses. Internal courses must be organised in schools to emphasis and the important of teaching HOTS to students and expose the teachers to pedagogical skills in teaching HOTS. Lack of resources of teaching in HOTS is one of the factors that demotivated the teachers to organised HOTS activity. Reference books are limited for teachers to prepare activity or problem solving questions. Therefore, teachers must be provided reference material and resources as it may help the teachers to create some HOTS activity based on their students ability (Kassim & Zakaria, 2015; N.S. Rajendran, 2002; Yusof, Othman, & Karim, 2005).

CONCLUSION

This study is mainly about the teachers’ perception about teaching HOTS during mathematics subject. The respondent of this research are teachers who have more than 7 years of experience in teaching Mathematics. The result of the interview conducted, it was found that teachers’ understanding about HOTS is still at a moderate level. Even though the teachers are encouraged to carry out HOTS activity during teaching and learning process, but teachers are more comfortable to use drill and practice method as it is one of the traditional method of teaching to prepare the students for public examination or school based assessment. The needs and problem that faced by teachers in the implementation of HOTS during teaching and learning process must be studied and resolved immediately.

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