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PROMOTING HOTS THROUGH THINKING MAPS

Hani Rashika Mohd Salleh[1]
Huzaina Abdul Halim[2]

[1] Faculty of Education, Universiti Malaya (UM), Malaysia, (Email: hanirashika@gmail.com)
[2] Faculty of Education, Universiti Malaya (UM), Malaysia, (E-mail: huzaina@um.edu.my)

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Abstract: *Malaysia as a developing country is looking forward to become fully developed nation by year 2020. To achieve the Vision of 2020 as inspired by Prime Minister Tun Mahathir Mohamad, "Innovative Human Capital" Plan is developed with special concentration given to Higher Order Thinking Skills (hereinafter referred to as 'HOTS') amongst Malaysia students in school education system via thinking skill. This endeavour is taken owing to the poor performance and lack of competencies and thinking skill ability of the Malaysian students in Reading, Mathematics and Science particularly on problem solving issues which require HOTS. As a result, the Thinking Maps program has been introduced in both primary and secondary school in 2013 to stimulate the students' HOTS. Since then, this program has being implemented in all schools throughout Malaysia. Numerous studies have further indicate that thinking skill approach is capable to help students promote HOTS and potentials holistically provided that they are given opportunities to master English through various teaching approaches and learning activities. Despite of its promising benefits offered to, few studies reveal that majority of the students do not have ample and adequate knowledge on how to use their schema (background knowledge) while reading a text. In lieu of the above, this study is conducted to firstly explore ESL teachers' experiences on teaching students using Thinking Maps and discovers ESL teachers' teaching strategies in enhancing students' HOTS outcomes in reading comprehension. It also access whether the teaching of thinking skills is effectively implemented in secondary schools and examines the influence of demographic factors in promoting HOTS. The integration of Thinking Maps in the teaching-learning processes as the promotion of HOTS shall then highlight. This study employs a qualitative method in which library research has been conducted to obtain reliable data. A range of priory works namely; articles journals, International and National Policies, online database, newspapers and magazines have been reviewed and systematically analysed using content analysis approach. This study further recommends that few strategies should be implemented to enhance the application of Thinking Maps in promoting HOTS.*

Keywords: *Thinking Maps, Thinking Skills, Inner Conversation*

Introduction

In Malaysia, school systems are increasingly focusing on higher order thinking skills (HOTS). For instance, the integration of HOTS in assessments and pedagogy have been introduced by the Ministry of Education (MOE), which is among the 11 Shifts of Malaysian Education Blueprints (2013-2025) (MEB), (MOE, 2012). Thus, MEB (2013-2025) has outlined six main features needed by each student to meet global challenges in line with National Education Philosophy (NEP), namely:

- Knowledge
- Thinking skills
- Leadership skills
- Bilingual skills
- Ethics and spirituality
- National identity

One of the aspects that has been highlighted in the MEB is thinking skills. Thinking skills should be taught by teachers to help students to promote HOTS and potentials holistically, providing that they are given chances to learn through varied teaching approaches and learning activities (Sulaiman, Mohd Ayub, & Sulaiman, 2015). For the success of this intention, special emphasis is placed on higher order thinking, therefore, the current education system is able to produce students who are competitive with the challenges of the 21st century (Hassan, Rosli & Zakaria, 2016). Since Malaysia has set the goal be the top in ranking of the Program for International Students Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), some initiatives have been taken to promote HOTS among students. HOTS can be enhanced by using teaching tools (Alper, Hyerle & Yeager, 2012). Visual representations for instance; Thinking Maps are teaching tools that assist students to promote their HOTS (Alper et al., 2012). Thinking Maps can also help teachers to deliver the knowledge and guide students to systematically organize their concepts or ideas. Therefore, it will also indirectly enhance students' HOTS.

Literature Review

Higher Order Thinking Skills (HOTS)

Higher Order Thinking Skills (HOTS) are one of the main elements in creative and critical thinking skills (King, Goodson, & Rohani, 1998) and it is believed that it is the highest level in hierarchy of cognitive process (Hassan et al., 2016). HOTS involve cognitive skills such as analyzing, synthesizing, evaluating and producing a new idea. When students use HOTS, they will make connections between other facts or concepts, manage to categorize, manipulate the facts and apply them for other situations (Collins, 2014). To stimulate students' thinking, questions can be used as a tool to encourage them to think out of the box. Students involved in questioning will be able to clarify their thinking, develop new ideas and improve problem solving skills (Lihui, 2015). According to MOE (2012), HOTS is "the ability to apply knowledge, skills and values in making of reasoning and reflection for problem solving, decision making, innovative and able to create something". If students can apply knowledge, they can understand a group of facts. Hence, a group of facts or ideas that belong together is a mental representation that helps them to organize their thinking (Collins, 2014).

Bloom (1956) had created an outlined taxonomy as the basis for the objective of teaching. The taxonomy begins by defining *knowledge* as the remembering of previously learned material. Knowledge is the lowest level of learning outcomes in the cognitive domain and it is followed by *comprehension*, the ability to grasp the meaning of material and goes just beyond the knowledge level. Furthermore, comprehension is the lowest level of understanding. On the

other hand, *application* is the next area in the taxonomy and refers to the ability to use learned material in new and concrete principles and theories. Thus, *application* requires a higher level of understanding than comprehension. In addition, *analysis* is the next area of the taxonomy; the learning outcomes require an understanding of both the content and the structural form of material. *Synthesis* refers to the ability to put parts together to form a new whole. Precisely, learning outcomes at this level stress creative behaviors with a major emphasis on formulating new patterns or structures. Finally, the last level of the taxonomy is *evaluation. Evaluation* is concerned with the ability to judge the value of material for a given purpose. The judgments are to be based on definite criteria. Learning outcomes in this area are the highest in the cognitive hierarchy because they integrate or contain elements of knowledge, comprehension, application, analysis, and synthesis (Rahil, Zaidatol, Habibah & Konting, 2004).

Bloom's taxonomy was revised by his former students, Lorin Anderson, with his partner in the original work on cognition, David Krathwohl (Hassan et al., 2016). They redefined Bloom's original concepts since 1995 to 2000. The major differences in the revised version is more useful and comprehensive of how the taxonomy interconnects and acts upon different types and levels of knowledge - factual, conceptual, procedural and metacognitive (Forehand, 2012). There were some changes made in terms of the terminologies (from noun to verb).

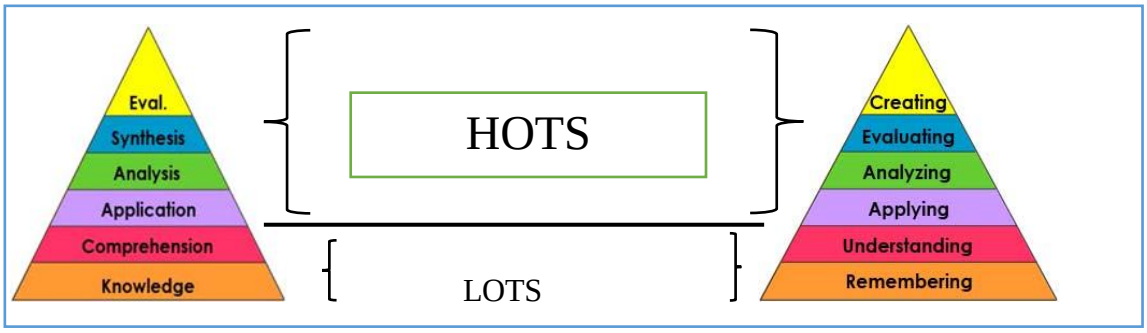

Figure 1: "The Graphic Is A Representation Of The NEW Verbs Associated With The Long Familiar Bloom's Taxonomy. Note The Change From Nouns To Verbs [E.G., Application To Applying] To Describe The Different Levels Of The Taxonomy. Note That The Top Two Levels Are Essentially Exchanged From The Old To The New Version." (Schultz, 2005)

Meanwhile, the international PISA and TIMSS assessments take into account a variety of cognitive skills such as application and reasoning. These assessments are also used as benchmarks and provide a direct comparison towards the quality and success in education systems of the countries that took part (Hassan et al., 2016). The questions tested in PISA gives more focus on problem solving that requires HOTS, such as analyzing, evaluating or synthesizing and not merely remembering or understanding.

However, there are indications that incorporation of HOTS in teaching is far from satisfying. A research conducted by AKEPT in 2011 as cited in the Malaysia Education Blueprint 2013-2025 (2012) revealed that only 50 per cent of 125 lessons observed in 41 schools across Malaysia engaged students in HOTS. Additionally, Malaysia's dismal ranking of 56 out of 76 countries in the 2015 PISA exercise (Malay Mail Online, 2015), which estimated students' thinking skills in mathematics, science and reading, indicates that students are poor in problem solving ability (The Star Online, 2015).

Thus, besides students to be equipped with HOTS, teachers particularly must be well-prepared with the skills to teach HOTS. This move has in fact long been taken by the Ministry of Education, with teachers given exposure to the teaching of thinking skills (Rahil et al., 2004). Thinking Maps is one of the programs that could help teachers and students to evaluate their thinking skills.

Thinking Maps

In Malaysia, MOE collaborated with Agensi Inovasi Malaysia (AIM) has launched an innovative program called i-THINK (Innovative Thinking). Officers from the MOE, State Education Department, District Education Office as well as National Trainers have received training on Thinking Maps from Kestrel Education, United Kingdom in 2011 with the aim to guide teachers to enhance thinking skills among Malaysian students. Then, these trainers were responsible to give training to teachers and students from ten pilot schools selected for i-THINK program in 2012. Later in 2013, there were about 1,000 primary and secondary schools which were also introduced to Thinking Maps. In May 2013, teachers from 510 schools have been trained to use Thinking Maps. Finally, the program has been implemented in all schools across the country by 2014. The purpose of the program is to inspire and to produce a successful, innovative generation in the future.

Currently, AIM has commissioned an extensive online program for teachers to support a blended training approach on Thinking Maps. The program is known as KiDT Online (Online i-THINK course) which aims to guide teachers to get basic knowledge about the eight maps and implement the tools in the classrooms. The i-THINK program has introduced eight fundamental thinking skills which are defined and animated by maps (Hyerle, 2000). The creator of Thinking Maps, David Hyerle, concluded that Thinking Maps are also known as a common visual language for thinking. The maps can be used across disciplines and each map has its own thinking processes. They are:

- Circle Map
- Bubble Map
- Double-bubble Map
- Tree Map
- Brace Map
- Flow Map
- Multi Flow Map
- Bridge Map

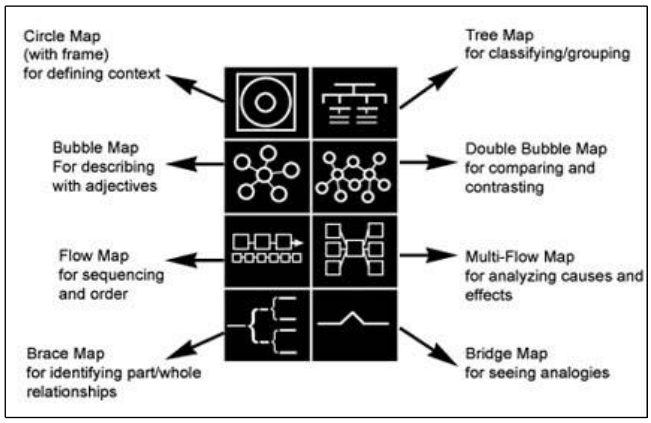

Figure 2: Thinking Maps

Source: Hyerle (1996). Thinking Maps: Seeing Is Understanding

Thinking maps are relevant to be used to promote HOTS (Hassan et. al, 2016). Thinking maps are non-linguistic representations that act as visual representations of thinking. Unlike graphic organizers which promote activities, thinking maps promote strategic thinking to help students to see which thinking skills are appropriate to be used to solve problems (Zahiri, Mat, Ibrahim, & Mustaffa, 2015). Thinking Maps can be easily applied and understood across English curriculum. According to Hyerle (2007) who developed Thinking Maps project, the process of thinking and reasoning becomes a culture when the teachers and students practice the thinking skills and reasoning during teaching and learning.

In Malaysia, few studies have been conducted by Hassan et al. (2016); Zahiri et al. (2015); Yusof (2014) and Amat (2009); on the utilization of Thinking Maps to promote HOTS that focuses on English, Mathematics, Tasawwur Islam and History subjects. Research by Hassan et al. (2016) indicates that Thinking Maps can be used to identify and use the geometrical characteristic of triangular to solve problems on the topic of polygon. Also, the teachers can use questioning technique to stimulate HOTS among students. Another study by Zahiri et al. (2015) showed that the use of Graphic Assessment Management (GAM) which was known as Thinking Maps, has improved Tasawwur Islam students' score. Similarly, Yusof (2014) found that the use of Thinking Maps had given effects on the improvement of students' Mathematics and reading comprehension. Sidek (2012) did a survey on the perception of the students on i-THINK program. His study produced a positive result in the implementation of the program. The study indicated that 95% students agreed that Thinking Maps could help to develop HOTS among teachers and students.

The Use of Thinking Maps in Reading Comprehension

It is important to note that reading a text requires thinking skills. It is impossible to read without thinking (Shihab, 2011). Thus, reading comprehension is an important part of language proficiency that affects academic literacy and success within the secondary academic context (Sidek, 2012). Additionally, ESL students have to acquire the ability to read critically (Fahim, M., Barjesteh, H., & Vaseghi, R., 2012) and obtain the required information from the reading text efficiently. However, many ESL students have difficulty in constructing meaning from the reading text (Praveen Sam & Rajan, 2013). A previous study done by Amat (2009), stated that most ESL students do not understand texts because they do not know how to analyze, synthesize and evaluate ideas. This indicates that many ESL students lack of HOTS in their reading.

In Kabilan, Seng, & Kee (2010) study, they conclude that many ESL students do not know how to use their schema (background knowledge) while reading a text. The interaction between students and the text will create an inner conversation. This inner conversation can create meanings based on students' schema (Aloqaili, 2012; Shihab, 2011). Nevertheless, many ESL students do not apply this approach. Besides, they still need teachers' assistance to help them comprehend the general ideas of the text (Mohd Noor, 2012). For instance, background knowledge or past reactions or experiences promote their thinking skills and help them to comprehend the text (Shihab, 2011).

According to Amat (2009), it is essential to teach ESL students how to think and use HOTS such as analysis, evaluation, and synthesis. In order to use HOTS, ESL students and teachers need to have a good understanding of metacognition and constructivism. Thinking Maps can help students develop metacognitive skills and help teachers facilitate learning using constructivism. In her study, she found that students' ability to compare and contrast in essay

writing has increased by 45% after instruction with Thinking Maps. These result shows that Thinking Maps can help students increase their HOTS. Additionally, students are able to relate one idea to another with a *double bubble map* by comparing and contrasting. Instead of using class discussion and lists, *double bubble maps* helped students to organize their comparisons and showed the relationships between ideas. Thus, Thinking Maps can be used as a tool to help organize their essay writing (A. Rahman, 2014).

In order to stimulate ESL students' thinking in reading classrooms, there are several techniques that can be utilized by the teachers for example questioning, comprehension monitoring and organizing the knowledge gained from the text (Abadiano, Helen, Turner, J., 2003). The objectives of teacher questioning are to develop students' understanding, to stimulate their inquisitiveness and to assist them to be active learners (Aziz @ Ahmad, A. A., Ismail, F., Ibrahim, M., & Samat, N. A., 2017). In their study, Aziz @ Ahmad et al. (2017) assert that "Teachers could foster students' thinking process upon the use of specific verbs that could trigger students' thinking process". The result shows that 25% of teachers used these verbs during questioning technique. The verbs that could foster students' HOTS were "try", "guess", "think", "give" and "construct". An example of teacher's instruction is "Think about three reasons why we must clean our teeth". Besides, many teachers (55%) used verbs that initiated low level thinking skills and need only factual answers from the students. This indicates that teachers still need to improve their teaching skills on how to foster students' HOTS in ESL classrooms.

Factors Influencing HOTS Application in Reading Classroom

Few studies have shown that teachers have realized that teaching of second language (L2) as difficult task for most students in regular public secondary schools in Malaysia, as most students have yet to reach the basic level of L2 skills (Aziz @ Ahmad et al., 2017; Othman, N., & Mohamad, K. A., 2014). Many teachers feel it is not appropriate to add in the HOTS elements to L2 students who are still weak in English language.

Students have been found to be passive and teachers have been found to be lack of creativity in integrating HOTS in their lessons (Yoke, Hasan, Jangga, & Kamal, 2015). Similarly, the reluctance and inability of teachers to innovate their activities in order to integrate HOTS in their lessons could create the gap between pedagogical content knowledge and the application of HOTS in the language classroom (Malini & Sarjit, 2014; Aziz @ Ahmad et al., 2017). Therefore, teachers should prepare and plan their lesson comprehensively to achieve successful implementation of HOTS in ESL reading classrooms. Teachers should also have positive attitude as well as the creativity in integrating HOTS in the lesson.

According to Aziz @ Ahmad et al. (2017), many teachers felt hesitant in implementing HOTS as they lack of skill to plan, implement and assess HOTS in L2 classroom, especially with students of varying proficiency levels. In addition, they asserted that the large classroom size influenced the pedagogical decisions of L2 teachers in the implementation of HOTS. The development of higher-order thinking skills like arguing, narrating, critiquing and creating new ideas, were not given much attention in most EL classes (A. Rahman, 2014). Nonetheless, in another study by Zuraina (2009), she affirms that the high level proficiency students could offer assistance to low level proficiency students in correcting their sentences and clarifying their ideas and thoughts if they were given task on HOTS in the classroom. Thus, this scenario can create collaborative work among students.

Conclusion

The importance of HOTS has created awareness in our society since it has been driven by the changes in education at the international level. These changes require students to be equipped with the knowledge and skills to deal with the problem-solving in daily life. The inclusion of HOTS specifically by using Thinking Maps in the L2 classroom needs a proper planning, particularly at the implementation stage. Teachers must be equipped with the right knowledge and skills to effectively explain and model HOTS strategies and at the same time are willing to provide students with plenty opportunities to activate and utilise HOTS in the L2 classrooms. Students, on the other hand, should be ready to be challenged to become active learners that monitor and reflect on their own learning processes while evaluating and interpreting information in critical manner. Indeed the implementation of HOTS has its own challenges, but with the right integrated efforts from various parties, valued outcomes may prevail.

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