Chapter 2 - Literature Review

2.1 Introduction

Society has changed over the years. There was a time when knowledge, comprehension and application were felt to be the necessary skills of life. Now these are felt to be inadequate. These are considered to be the lower-order thinking skills of Bloom's Taxonomy. With the onset of the technological and information skills era, there is a pressing need for something more challenging. It was felt that young people should be more acute in critical thinking, analytical and problem-solving skills. This moves us to the next stage of Bloom's Taxonomy which is the higher-order thinking skills or HOTS. As stated before, HOTS involves mental activities such as critical thinking, analysis and problem-solving.

2.2 Views of Thinking

The first philosophers to write about HOTS are the Greek philosophers Socrates and Aristotle. Socrates (470 – 399 BC) through his Socratic Method laid the basis for critical thinking. Aristotle (384 – 322 BC) put forth two basic forms of thinking. One was contemplation which according to him, led to conclusions whereas the other, deliberation, led to decisions.

At the turn of the twentieth century, Sumner (1906) felt critical thinking is an important requirement for human well being and that in thinking collaboratively the human minds allowed the development of new knowledge.

Ennis R. H.(1987) put forth the argument that the concept of higher-order thinking skills was too vague to be applied to schools and that teachers are not too well guided as to how best to apply it. On the other hand, Resnick, Lauren (1987) felt that although it may be difficult, higher-order thinking skills teachers may be able to recognize it in the classrooms. Ivie (1998) pointed out that although there are a lot of references to higher–order thinking skills in education, there is little effort as to the definition much less the best way to teach them. However, the present researcher firmly believes that Bloom's Taxonomy of Learning Objectives have clearly defined the higher-order and lower-order thinking skills with a whole set of key words. Wilson (2000), said that the word 'skills' implied that the elements within this continuum can be taught.

Tama's (1989) views on critical thinking was supported by Wilson (2000) and Cotton (2001) that thinking skills need to be taught to students. He said that this can be achieved by following three principles. "First, teachers need to encourage active learning which is described as learning by doing within a group setting. Second, students need to verbalize their thoughts and this again required a group environment and by this their understanding of the subject is developed. Finally, students need to think about their thinking."

(http://adt.curtin.edu.au/theses/available/adtWCU20070525.172626/unrestricted/03Chapt2.pdf)

Browne and Keeley (2007) are of the view that critical thinking helps "students to bridge the gap between simply memorizing or blindly accepting information and the greater challenge of critical analysis and synthesis. It teaches them to respond to alternative points of view and develop a solid foundation for making personal choices

about what to accept or reject." (http://adt.curtin.edu.au/theses/available/adt-WCU20070525.172626/unrestricted/03Chapt2.pdf). They further continue to say that critical thinking can be used to defend or evaluate your views.

"Parallels have been drawn between Bloom's Taxonomy (Bloom et al, 1956) and the thinking skills required for reading (Hickey, 1990). Hickey referred to lower-order (recalling detail, sequencing events and recognizing main ideas) and higher-order (recognizing cause and effect, distinguishing between fact and opinion, recognizing purpose and bias reading skills). Both sets are seen to incorporate a combination of analytical and evaluative processes." (http://adt.curtin.edu.au/theses/available/adt-WCU20070525.172626/unrestricted/03Chapt2.pdf)

"Passey (1999) suggested that thinking skills can be categorised using a predetermined structure such as that provided by Bloom et al (1956). Bloom's Taxonomy of educational objectives describes a hierarchy of cognitive achievement commensurate with the contemporary psychological principles. Passey has listed a range of thinking skills that would be expected to be demonstrated at each of Bloom's levels."

Bloom's Category	Associated Thinking Skills
Knowledge Acquisition	Memorising
Comprehension	Questioning, discussing, explaining, doing
Application	Abstracting, transferring
Analysis	Categorising, characterising, Comparing, contrasting
Synthesis	Collecting, creating
Evaluation	Establishing relevance, judging

Table 2.1: Thinking skills associated with Bloom's Taxonomy - (http://adt.curtin.edu.au/theses/available/adtWCU20070525.172626/unrestricted/03Chapt2.pdf)

Tables 2.1 and 2.2 show the connection between Bloom's Taxonomic levels and to what is stated by the others. As can be seen, they are focussed more on higher-thinking skills.

Bloom's category	Burlett 1992	Fraenkel 1980	Mayer 1977	Chance 1986	Hudgins & Delman 1986	Sternburg 1986
Evaluation	✓		✓	✓		✓
Synthesis		✓		✓	✓	✓
Analysis	✓	✓	✓	✓		✓
Application						
Comprehension						
Knowledge Acquisition						✓

Bloom's category (continued)	Tama 1989	Hickey 1990	Mayer & Goodchild 1990	Merths 1991	Seriven & Paul 1992	Ennis 1992	Huitt 1992
Evaluation	✓	✓	✓	✓	✓	✓	✓
Synthesis			✓		✓	✓	✓
Analysis		✓	✓	✓	✓	✓	✓
Application					✓		
Comprehension							
Knowledge Acquisition							

Table 2.2 Definitions of Thinking associated with Bloom's Taxonomy

(http://adt.curtin.edu.au/theses/available/adtWCU20070525.172626/unrestricted/03Chapt2.pdf)

Recently Bloom's original domain was revised by his own student, Lorin Anderson (1990s) (www.odu.edu/educ/roverbau/**Bloom/blooms_taxonomy**.htm). A few changes were made such as changing the headings from nouns to verbs and the levels were reorganized. Verbs are being used to indicate an active thinking process. Synthesizing which is closely associated to creating is placed on a higher level as compared to evaluation. This can be seen in the table below:

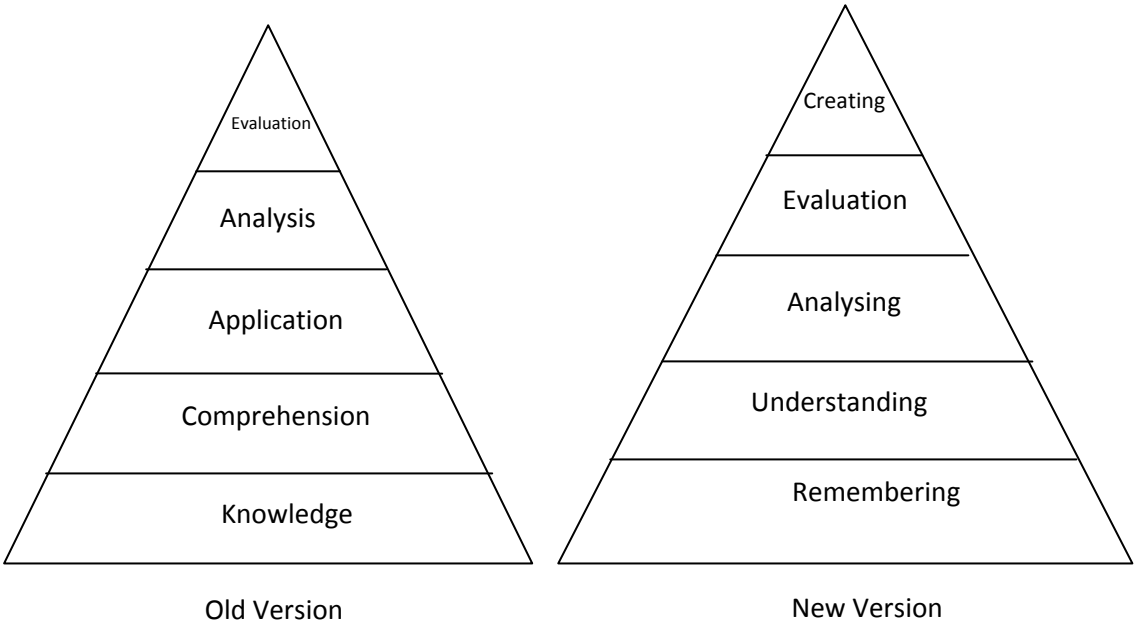

Diagram 2.1 Terminology Changes

Bloom's Taxonomy	Anderson's Taxonomy
Knowledge	Remembering
Comprehension	Understanding
Application	Applying
Analysis	Analysing
Synthesis	Evaluating
Evaluation	Creating

Table 2.3 Anderson's Revision of Bloom's Taxonomy

(Bloom's Taxonomy, Emerging Perspectives on Learning, Teaching and Technology)

There are further subdivisions in Anderson's revised taxonomy which is an entirely different discussion.

Another significant authority on thinking skills is Dr. Edward Bono who has written extensively on it. Dr. de Bono, of the University of Malta, has for more than 25 years been an authority on the teaching of thinking skills. His works on lateral thinking applies a lot to human problem-solving. Dr. de Bono says that there are two types of thinking, namely vertical thinking and lateral thinking. Vertical thinking uses the processes of logic and works on the traditional style. Lateral thinking involves arriving at the solution from different angles.

Edward de Bono's Six Thinking Hats technique (1985) helps one to make good important decisions. The White Thinking Hat helps one to focus on the available data. The Red Thinking Hat depicts feelings, hunches and intuition. Wearing the Black Thinking Hat signifies judgement. It helps one to spot difficulties and dangers and to see where things might go wrong. The Yellow Thinking Hat helps one to think positively. The Green Thinking Hat on the other hand focuses on the creative side of things. Last but not least, the Blue Thinking Hat gives a cool, overview for process control. It ensures that the Six Thinking Hats guidelines are followed.

Thus it can be seen that the Six Thinking Hats technique is simple, effective and can be applied with more immediate effect. Using the technique helps one to be productive, mindfully involved and focussed.

2.3 Higher-Order Thinking Skills in Malaysia

According to Thomas A. and Thorne G. (2001), in their article, no one thinks perfectly or poorly all the time. They also said that memorizing something is not the

same as thinking about it and that a person can memorize something without understanding it. They also stated in their article that thinking is done in both words and pictures. Hence, there are three main types of intelligence and thinking: analytical, creative and practical. They said all three intelligences and ways of thinking are useful in our everyday lives and one can improve one's thinking by understanding the processes involved in thinking. Therefore, the metacognition-thinking about thinking is that thinking is part of higher–order thinking.

In Malaysia, there is a realization to produce a critical thinking society. As such, critical thinking skills, scientific skills as well as technological skills have formed a component of the primary and secondary school syllabus. This in turn, regards the teachers as "agents of change" (Othman. N, 2002) in preparing the children for the new era.

Nurliza Othman in her article, Thinking Skills – A Motivational Factor in ELT, 2002, mentioned the necessity of teaching thinking skills to Malaysian school children and says "there exists a need to look at teachers as agents of change."

Dr. Devikamani Menon (2005) of the University of Malaya, in her article 'Using Three Interactive Teaching–Learning Techniques To develop Thinking Skills in ESL Teacher–Students' stressed on the use of the 4 C's of education namely constructive thinking, critical thinking, creative thinking and collaborative thinking to develop the thinking skills. She felt these can be used in the three interactive techniques of Group Discussion and Individual Presentation (GDI), Group Discussion and Group Essay (GDE) and Interactive Journal Writing (IJ), to develop thinking skills.

According to Dr Rajendran Nagappan in his article, The Teaching of Higher–Order Thinking Skills in Malaysia (2001) "the formal and systematic teaching of

higher-order thinking in Malaysian classrooms started in the early 1990s." In order to implement this, the curriculum and the use of resource materials by teachers were reformulated and teacher educators and the teachers were sent for training.

In 1982, the Primary School Curriculum was renamed as Integrated Primary School Curriculum and later it became the Integrated Curriculum for Secondary Schools (ICSS) in 1988. These curricula incorporated critical thinking skills in the syllabus. In order to show the necessity of teaching thinking skills as part of the curriculum, it states, "The contents of the curriculum promote the development of thinking abilities to enable students to analyse, synthesize, explain, draw conclusions, and produce ideas that are both constructive and useful" (Curriculum Development Centre, 1989, pg 6 – *The Teaching of Higher-Order Thinking Skills in Malaysia,* Rajendran Nagappan, 2001).

The former Director-General of Education, Datuk Matnor Daim emphasized at that time (in the 1990s), the necessity for teachers to teach thinking skills. He went on further to say "They (students) have to learn to manipulate ideas and feelings that are contained in the text they read, and that needs thinking skills" (Indramalar, 1997a – The Teaching of Higher-Order Thinking Skills in Malaysia, Rajendran Nagappan, 2001). Datuk Matnor Daim felt that by this, students "will be able to critically examine, select and organize the information they receive." (Rajendran Nagappan, 2001, *The Teaching of Higher-Order Thinking Skills in Malaysia*).

Courses and workshops such as on "Accelerated Learning", "Optimal Learning", "Critical & Creative Thinking" and de Bono's "CoRT Thinking Tools" have been conducted in Malaysia since the 1980s.

As a result, an attempt was made to teach thinking skills in schools in 1993 and in 1994 in the teacher education colleges. This showed commitment on the part of the

Ministry of Education in enforcing all this. The Curriculum Development Centre identified 4 models which can be used in the classrooms. The first model was by Robert Swartz and Sandra Parks and this model was prepared by the National Centre for Teaching Thinking in Boston. This model was popularly known in Malaysia as the "Boston Model". The second model was the 'KWHL Model', where 'K' is for 'knowledge', 'W' for 'what', 'H' is for 'how', and 'L' is for 'learnt'. The third model consists of CoRT 1 (Widening the Perception) and CoRT 4 (Creative and Lateral Thinking), which were both developed by Edward de Bono. The last model was called 'Programmed Instruction in the Learning of Thinking Skills (PILTS)' which was developed by two local academicians, John Arul Philips and Fatimah Hashim. The guide from the Ministry of Education proposed various strategies, techniques, and activities which could be used by teachers to teach thinking skills in the classrooms." (Rajendran Nagappan, 2001, *The Teaching of Higher – Order Thinking Skills in Malaysia*).

To fulfil the objectives of the National Philosophy of Education (NPE) and Vision 2020, the Ministry of Education prepared model lesson plans on how thinking skills can be taught in various subjects and also trained 'key–personnel' to impart their knowledge when they returned to their respective schools. The policy announcement of 1994 said that by 2000, at least 60 percent of public examination questions will test students on thinking skills.

As of June 1994, the Teacher Education Division had to make changes in its programmes to incorporate the teaching of higher-order thinking skills. They adopted the "Boston Model" to train their teachers. "The "Boston Model" or the infusion model, advocated integrating teaching critical thinking in all content areas and at all grade levels rather than using a pre-packaged programme or curriculum (Nagappan,R,2001,

Teaching of Higher-Order Thinking Skills in Malaysia). The teachers were exposed to the other models inclusive of the CoRT Thinking Tools.

Thus it can be seen that efforts were made to incorporate higher-order thinking skills in the Malaysian education system.

2.4 Higher-order Thinking Skills, Language Cues and MUET

In Malaysia, now, there is a need to create a society which makes use of the higher-order thinking skills which is basically analysing, critical–thinking and problem–solving. This comes in the wake of the Information and Communication (ICT) Age, globalization and the slow fading away of the traditional society. “In keeping pace with the digital age, the Malaysian government had promptly introduced guidelines for schools, universities and the human resources council to create a lasting paradigm of learning to be instilled in our children and the k–workforce. Among the guidelines formulated was a corpus for dealing with the question of Malaysians’ literacy in IT and the English language.”

http://www.studymalaysia.com/education/art_english.php?id=muet

Apart from all this, with the establishment of the Multimedia Super Corridor came the realization of the importance the English Language for usage in the international arena. In Malaysia, the social reality was the decline in the usage and mastery of the English language. “Not being able to use, let alone master, the language of the computer and Internet age was seen as a spectre of doom over the future state of Malaysia, considering the reliance on, and reward from, Internet–based enterprises such

as e–commerce, e–business and e–learning as experienced by the globalized knowledge economy."

http://www.studymalaysia.com/education/art_english.php?id=muet

Since this realization, the Malaysian government has urged all institutions of learning, both public and private to become more proficient in the usage of the English language and to upgrade themselves in skills such as e–learning and smart learning and on the application of intelligence. In the civil service and private sectors, they were encouraged to reach a certain level of competence in the usage of the English language.

On the national education level, where English is taught as a second language from the primary to the end of the secondary level except for the Sixth Form, there was a gap. Thus, it was to fill up the gap and at the same time to have a certain level of proficiency to ease the perseverance of the tertiary, that the Malaysian University English Test or MUET was introduced in 1999.

It is hoped that apart from attaining the proficiency level, the skills of higher–order thinking can also be introduced in the Malaysian University English Test or MUET to create a thinking society in line with the Malaysian National Education Policy.

"According to Kenneth Goodman's Psycholinguistic Reading Theory, there are 4 language cueing systems that readers activate in order to read text: The graphophonics, the syntax cueing system, the pragmatic cueing system and the semantic cueing system" (Rhodes and Shanklin, 1993, p.150; Brandi R. P. Thacker: Whats Your Cue? Incorporating the Semantic and Graphophonic Cueing Systems into the students' reading-

http://msit.gsu.edu/readingconsortium/The_Literacy_Lens/Articles/2_2_/cue.pdf).

According to Thacker, all these cueing systems have to be put into use in order to attain comprehension. He calls the relationship between letters and their sounds as the graphophonic cueing system. The grammar and the sentence structure in a text can be used to foretell what will come next in the syntax cueing system. In the pragmatic cueing system, the students can use their knowledge to know what words are normally used in those familiar situations. According to Thacker also, in the semantic cueing system context clues are used to know the meaning of language.

According to Johnnie Tankersley, Cornerstone Framework, the language cues in the language cueing systems are divided into 6 categories. They are:-

1. Graphophonic – symbols, letters and letter combinations to represent phonic sounds

2. Lexical – Sight and Memory words

3. Syntactic – The structure of words letters, sentences and whole texts so the texts are readable. This includes punctuation

4. Semantic – Meaning at the word sentence and the whole text levels

5. Schematic – Comprehension strategies

6. Pragmatic – Interacting with the text discussing the text with others, writing responses to text, this takes the learning from short to long–term memory.

(http://www.conerstoneliteracy.org/NEWSLETTER/volume5_2/altogether.html)

In her dissertation, The English Language Needs of Medical Students in Institutions of Higher Learning, 2003, Saraswathy Ponampalam did a study to find out if the language needs of these medical students were met by MUET at STPM (Sijil

TInggi Pelajaran Malaysia/Higher School Certificate) level. In her findings, she clearly stressed on the importance of the four language skills, namely, Listening, Speaking, Reading and Writing. These are the four language skills found in MUET. In the data that she had gathered, Listening was by far the most important skill followed by Speaking, Reading and Writing. The findings of the study also had implications on the teaching and learning of the English Language at the pre–university level. The language needs of the student have to be identified from time to time. She also suggested that these needs analysis will not only be beneficial to the students, but will also help to increase the effectiveness of MUET.

"The simplest thinking skills are learning facts and recall, while higher-order skills include critical thinking, analysis and problem solving."

(http://en.wikipedia.org/wiki/Higher_order_thinking_skills)

There was a little story about Thomas Edison who was once asked how he was kept from getting discouraged when he had made so many mistakes before he had perfected his idea of the light bulb. He had tried over two thousand ways before one worked. It was claimed that Edison had responded by saying that he had not made two thousand mistakes. In fact, Edison was said to claim that he had had more than two thousand learning experiences which had enabled him to move closer to the answer. This little anecdote is in line with the issue of problem-solving which is one of the features of higher–order thinking skills.

According to Thomas,A and Thorne,G (2001), in their article, it is very important to learn to problem solve while still in school. The researcher agrees with these writers because the school is the best training ground for these kinds of things. The writers go on further to say that in a school, the students learn to solve problems

like what to write for an essay, or how to solve a mathematics problem, or choosing the correct materials for a science experiment, even deciding who to sit next to for lunch. This goes to show that not a day goes by where a person does not have to solve problems. Therefore, how students go about trying to solve their problems is important in terms of how successful the results will be. Here, the students will have to learn that problems will have to be worked through systematically and logically in order to come to a satisfactory conclusion. It does not mean that being the first one to finish is not always the way to win in the game of problem solving.

Prof. Zosimo E. Lee of the University of Philippines, in his article, Cognition, Rationality and Higher–Order Thinking (2006), talked about four themes, namely, critical and creative thinking, higher–order thinking, thinking as a craft and the end result of education. In fact, higher–order thinking is a blend of both critical and creative thinking and higher–order thinking involves a series of several mental activities. Prof. Lee says the key terms in higher–order thinking are: judgement, criteria, self–regulation, meaning and the most important adjectives are: elaborative, nuanced, complex and multiple. To add further, Prof. Lee goes on to say that higher–order thinking seeks intelligibility, exhibits largeness of scope and tends to display unity, integrity and coherence. The researcher wishes to add that all this involves the use of language as well. Hence, the use of language cues in higher–order thinking skills in MUET would be ideal.

2.5 Summary

In this chapter, it was seen that due to the changes that have taken place in society over the years, there is now a pressing need to have a critically thinking society.

The researcher showed terms such as critical thinking, higher–order thinking, and lower–order thinking had always been there. It is only now, due to changes in society that all these things are coming to light. First, the researcher touched on some of the works on thinking. On the Internet, a whole sea of material on thinking is available.

In Malaysia, this aspect has only recently come to light, in the last twenty–five years or so. There are very few local writers on this, such as Nurliza Othman, and Prof Dr. Rajendran Nagappan. These people have stressed on the need to have thinking skills or if not higher–order thinking skills to be part of the Malaysian school curriculum. In fact, Prof. Dr. Rajendran Nagappan has shown that thinking skills are indeed part of the Malaysian school curriculum because of the implementation of the Integrated Primary School Curriculum in 1982 and the Integrated Curriculum for Secondary Schools in 1988. Despite several efforts on the part of our Malaysian Ministry of Education, the implementation on the teaching of thinking skills in schools is still very much in the infant stages due to various reasons.

It was with this knowledge, that the researcher felt that higher–order thinking skills could be incorporated along with language cues in the Malaysian University English Test. “Higher–order thinking comes naturally once students find themselves seriously engrossed in a dialogue about things that matter to them..... An educated person learns how to engage in higher–order thinking and is well on her way to teaching herself and learning on her own. Education should aim for enhancement of the thinking skills of children so that they become competent thinkers, engaging in the craft and skill of thinking so that they will be able to generate higher–order thinking and thus become adept at providing themselves with the insights that empower their own judgements, decisions and actions.” (Zosimo E. Lee, 2006, Cognition, Rationality and Higher–Order Thinking).