Using Constructivist Approach To Teach Higher-Order Thinking Skills: Transforming Teaching Practice to Facilitate Mindful Learning

By:

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Abstract:

There are now deliberate attempts to infuse higher-order thinking skills in content instructions in classrooms. There are compelling reasons which justify this innovation and there are many factors that need to be addressed for this innovation to be successful. Curriculum planning, teacher preparation, evaluation of the acquisition of higher-order thinking skills by students, and support systems for teachers are some of the important factors. However, what seems to be the most important challenge is transforming the characteristics of teaching practice in classrooms to provide an environment which is conducive for the teaching and learning of higher-order thinking skills and which could facilitate mindful learning by students. While most teacher education programs are unsuccessful in helping prospective teachers overcome the initial apprenticeship of observation which has shown to significantly influence teaching and learning of these teachers, it obviously becomes a major challenge to help teachers transform traditional teaching and learning which is often regarded antithetical to the kind of teaching and learning required to facilitate mindful learning. The constructivist approach provides, yet another, option to teachers to create and provide opportunities to students to be actively involved in the meaning making process, which in fact enhances the acquisition of higher-order thinking skills. This paper will review various factors related to the constructivist approach and how it could help enhance the acquisition of higher-order thinking skills. There will also be discussion about teaching and learning processes in Malaysian classrooms in relation to usage of constructivist approach and the opportunities for students to acquire higher-order thinking skills. This paper will be prepared on data obtained for a research on teaching higher-order thinking skills.

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Introduction

Teaching children to think critically has been perhaps the most popular, fastest growing part of the thinking skills movement. The interest probably comes from two major sources: a combination of a growing conviction that we must have adults who are critical thinkers and a dawning awareness that we are not achieving this result. The National Assessment of Educational Progress (NAEP) (1981) found, "…Few students could provide more than superficial responses to such tasks , and even the 'better' responses showed little evidence of well-developed problem-solving strategies or critical thinking skills"(Langer J.A., and Applebee, A.N., 1987, p.4). Another NAEP report published in 1986 found that, " …A major conclusion to draw from this assessment is that students at all grade levels are deficient in higher order thinking (HOT) skills". All these situations have warranted the teaching of HOT skills in schools. However, the big question is how best to teach HOT skills to students so that they will be better problem solvers and decision makers.

The Scope of this review

It is important to determine the scope of this review. This is because many of the terms used in teaching thinking skills have various definitions depending on the purposes it is used for. The term "thinking", for example, Sigel explains as "thinking is a term we often use but rarely defined precisely" (1984, pp.18). In this respect, the first question we need to address is: "What is thinking?" There are different approaches to defining thinking, according to Sigel (1984, pp.18) ranging from "reflection, mediation, and cogitation (suggesting passive reception) to mental actions such as conceptualization and problem solving (implying an active approach)".

Researchers and educators have advocated many conceptions in relation to "thinking": critical thinking, divergent or creative thinking, reasoning (moral, inductive, deductive, formal, informal), problem solving, decision making. These conceptions can all be subsumed under the larger construct of higher-order thinking and made distinct from lower-order thinking (Onosko and Newmann, 1994, pp.28). For the purpose of this review, High Order Thinking (HOT) is defined broadly, as the expanded use of the mind to meet new challenges. Expanded use of mind occurs when a person must interpret, analyze, or manipulate information, because a question to be answered or a problem to be solved cannot be resolved through the routine application of previously learned knowledge (Onosko, J & Newmann, F., 1994). Lower-order thinking represents routine, mechanistic application and limited use of the mind. This process generally involves repetitive operations such as listing information previously learned formulae, applying procedural rules, and other routinized or algorithmic mental activities.

No particular question or problem, however, necessarily leads to higher-order thinking for all students. To determine the extent to which a task will involve an individual in higher-order thinking, one presumably needs to know much about

that person's history with the task. In addition, one would need to "get-inside" the person's head or experience his or her subjective state of thought to asses the extent to which an individual is participating in the analysis, interpretation, and manipulation of information (Schrag, 1989, quoted in Onosko and Newmann, 1994, pp.28). This definition poses a operational problem. It is difficult to determine reliably the extent to which a person is involved in higher-order thinking. The teaching of thinking, therefore, is rather imprecise enterprise. For this, Onosko and Newmann have a suggestion.

> The best we can do is to engage in what we predict will be challenging problems, guide student manipulation of information to solve problems, and support students' efforts. This conception has several positive features. First, it assumes that any person, young or old, regardless of experience or prior knowledge, can participate in higher-order thought. Students will differ in the kinds of challenges they are able to undertake and master, but all can confront challenges in the interpretation, analysis, and manipulation of knowledge. Second, the conception encompass cognitive activity in a wide range of school subjects as well as in nonacademic areas. Third, it does not require acceptance of particular theory of cognitive processing or rely on a particular pedagogy. This is an advantage, because persuasive evidence on the best techniques for the promotion of thinking does not exist. Finally, this conception is hospitable to providing students with three important resources for thinking that recognized widely in the literature: content knowledge, intellectual skills, and dispositions of thoughtfulness.
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> (Onosko and Newmann, 1994, pp.29)

To ensure that they are enhancing HOT, many teachers rely on classification systems or taxonomies that differentiate the levels of thought various questions elicit. By far the most popular system for classifying questions is Bloom, Engelhart, Furst, Hill, & Krathwohl's (1956) taxonomy (Marzano, 1993, pp.155). Most educators are aware of Bloom's six levels of cognitive processing: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Presumably, as one asks questions at the "higher levels" of the taxonomy, more sophisticated levels of thought are elicited. Unfortunately, this assumption is not supported by much of the research on the taxonomy. It has also been shown that teachers have little success differentiating one level from another, specifically at the higher levels (Ennis, 1981; Wood, 1977, quoted in Marzano, 1993).

This review attempts to investigate one of the recent approaches, the constructivist approach to the teaching of HOT skills. The aim is to find, yet another approach to teach HOT skills to the students effectively. Since constructivism, among others, tells us to pay close attention to the mental activities of the learner (Bereiter, 1994), it is hoped that using this constructivist approach to the teaching of HOT skills will boost the effects of teaching those skills to students.

What Constitutes a Constructivist Approach to teach Higher-Order Thinking Skills

For surely it was Dewey who, in modern times, foresaw that education had to be redefined as the fostering of thinking rather than as transmission of knowledge. For many reasons our schools should be attending consciously and systematically to improving the thinking abilities to our students. Teaching thinking helps students survive in school in at least three ways. First, by providing explicit instruction in the various operations that constitute thinking, teachers can improve student proficiency in thinking itself. Second, such instruction can also improve student achievement in the academic subjects where this skill instruction is provided. Finally, instruction in thinking gives students a sense of conscious control over their thinking. When this is combined with the improved academic achievement resulting from such thinking, students develop a sense of self-confidence associated with even more achievement in school as well as outside school (Purkey, 1970).

However, the schools are faced with many serious problems in promoting HOT skills in their curricula. One of the debates concerns what the appropriate curriculum ought to be for schools designed to everyone. This is because, as Resnick and Resnick (1970) believe, “Mass education derives from a ‘low-literacy’ tradition aimed at producing minimal levels of competence in the general population”. To further strengthen this argument, Resnick (1987, pp.7) believes that, “Although it is not new to include thinking, problem solving, and reasoning in someone’s school curriculum, it is new to include it in everyone’s curriculum”.

There has been tremendous amount of interest shown to teach HOT skills in schools to everyone, at least in the recent times. This has been the exclusive component of the elite education in the past. In the last decade or two, cognitive science research has allowed us to look into the thinking mind, figuratively at least, and to specify more precisely the reasoning processed of both successful and less successful thinkers (Newell and Estes, 1983, quoted in Resnick, 1987). More recently, researchers have begun to investigate how the ability and the propensity to think well are acquired and maintained. These two bodies of research - on the nature of human thinking and on the acquisition of thinking and learning skills - are beginning to make explicit what we mean by high-order skills and what means of cultivating such skills are most likely to be successful.

This process of making explicit the abilities formerly left to the intuitions of gifted learners and teachers is precisely what we need to establish a scientific foundations for the new agenda of extending thinking and reasoning abilities to all segments of the population (Resnick, 1987, pp. 7). Research suggests that failure to cultivate aspects of thinking such as promoting Higher-Order Thinking (HOT) skills may be the source of major learning difficulties even in elementary school.

There is also a belief that something new and more effective should be created to educate the children to face the new challenges of the world. As

Glasersfeld (1995) suggested, “Whatever its (education) methods and effectiveness were, it seems to have suffered a decline during the last 20 or 30 years”. He also suggested that, “There is a general consensus that something is wrong because children come out of school unable to read and write, unable to operate with numbers sufficiently well for their jobs, and with so little knowledge of the contemporary scientific view of the world that a large section still believes that the phrases of the moon are caused by the shadow of the earth”.

One of the arguments which explains this state attributes to the fact that, “We have suffered the virtually undisputed domination of a mindless behaviorism” (Glasersfeld, 1995). It believes that, the behaviorist succeeded in eliminating the distinction between training (for performance) and teaching that aims at the generation of understanding. Its fundamental principal was the “law of effect,” an observation that animals, including us, tend to repeat the actions that lead to satisfactory results. For education, this learning theory has had unfortunate consequences. Most importantly, it has tended to focus attention on students’ performance rather that on the reasons that prompt them to respond or act in a particular way.

Constructivism is quickly becoming the dominant learning theory in education (Wittrock, 1974, quoted in Marzano, 1993). In simplistic terms, the constructivist theory postulates that meaning is “constructed” by the learner via the interaction of “new” information with “old” information existing in long term memory (Clark and Clark, 1991, quoted in Marzano, 1993). In keeping, a number of strategies have been developed to facilitate learner’s accessing what they already know about a particular topic, using this knowledge to make predications about what they are learning, and then confirming or disconforming their initial guesses.

To further explain this, it is an emphasis on learning involving active construction by the learner, having as a source the learner’s own experience, with the teacher playing a facilitatory role providing appropriate situations, tasks, and conditions (Becker and Varelas, 1995). In particular, ‘understanding’ as achieved through an activity that students have to carry out themselves and that no one else can do for them. This is in line with what Piaget professed. Each time one prematurely teaches a child something he could have discovered himself, the child is kept from inventing it and consequently from understanding it completely (Piaget, 1970, quoted in Becker and Varelas, 1995).

How is the Constructivist Approach connected to the cognitive development of the child?

It has to be acknowledged that the various theories of learning are each useful, perhaps in a different context. For the behaviorists, the issue was not how new knowledge is acquired. Instead it was: How is new behavior acquired? (Philips and Soltis, 1991). In other words, to the behaviorists learning was a process of expanding the behavioral repertoire, not a matter of expanding the ideas in the learner's mind. Besides the behaviorists theory, the Gestalt theory views learning as a process involving the attempt to think things out and then having "it all come together" suddenly in the mind. The Gestalt psychologists looked beyond behavior and the environment, and they tried to throw light on learning by investigating tendencies of the mind to pattern and structure experience.

Beginning with a hunch about the importance of firsthand experience to learning, John Dewey developed a "problem solving" theory of learning whose basic premise was that learning happens as a result of our "doing" and "experiencing" things in the world as we successfully solve real problems that are genuinely meaningful to us. Taking a biological approach, Piaget viewed learning as an adaptive function of an organism. By means of learning, an organism develops "schemes" for dealing with and understanding its environment. For Piaget, learning is the individual's construction and modification of structures for dealing successfully with the world. He also claimed that, there are stages of development that all human beings pass through as they learn universal schemes for structuring the world and as they learn certain aspects of logical reasoning.

It is no surprise, then, that Piaget approached the function of thinking and learning in terms of the mental or cognitive structures that make it possible (Philips and Soltis, 1991). Piaget seems to have regarded these structures as being quite real, although they are directly unobservable. Piaget believed that the developing child was busy constructing cognitive structures. At first the child had to learn to coordinate its physical movements - grasping, bringing objects to its mouth, and so on. Piaget spoke of the child constructing a schema for each of these complex activities. Piaget used the biological notions of assimilation, accommodation, and equilibration to explain how cognitive structures develop. At any stage of his or her development, the young learner will be interacting with the environment, using whatever cognitive structures have constructed up to that moment.

From the constructivist perspective, as Piaget stressed, knowing is an adaptive activity (Glasersfeld, 1995). This means that one should think of knowledge as a kind of compendium of concepts and actions that one has found to be successful, given the purposes one had in mind. Piaget's concept of knowledge is one that in no sense involves the idea of getting to know an ontological reality that would have to be imagined as a prefabricated, fully structured world, existing by itself and waiting to be 'discovered' by a cognizing organism.

Piaget sought to create a biological, evolutionary view of cognitive development, and describe the invariance in human cognition in terms of invariance of structures, many of which he assumed mirrored the mathematics of

groups (Confrey, 1995). For the most part, Piagetian theories sought to create a framework to explain how the individual constructs a knowledge of scientific, logical and mathematical ideas, and his theories apply most easily in these arenas. For Piaget, higher cognitive functions lie in the arena of logical, mathematical knowledge. Piaget located the development of higher cognitive functions in the development of logical thinking, the construction of object characteristics, and in an understanding of such global constructs as space, time, and number.

Vygotsky, Dewey, and Bandura addressed the lack of a social dimension in learning. For example, Vygotsky viewed thinking not as a characteristic of the child only, but of the child-in-social-activities with others (Moll and Whitmore, 1993). In terms of classroom learning, Vygotsky specifically emphasized the relation between thinking and what we would call the social organization of instruction.

In a Vygotskian perspective, the construction of knowledge proceeds in two directions that both enable and limit each other: toward the induction of the individual into cultural practice; and toward empowering the individual as an autonomous thinker. A major concern for Vygotsky is to conceptualize the interaction between the understandings already achieved by the learner and the further cultural achievements brought to the learner from outside. The interaction has two directions: the learner makes the cultural achievements brought to him or her from the outside meaningful using the understandings that he or she brings to the interaction; and the learner reorganizes the concepts that he or she brings to the interaction rendering them more systematic and volitional using the nature of the cultural achievements brought to him or her from the outside (Becker and Varelas, 1995).

Vygotsky and his colleagues constructed a cultural-historical view of developmental psychology and emphasized higher mental activities such as thinking, memory, and reasoning (Miller, 1993). Vygotsky argues that all higher psychological processes are originally social processes, shared between people, particularly between children and adults (Brown and Ferrara, 1985). The child first experiences active problem-solving in the presence of others but gradually comes to perform these functions independently. The process of internalization is gradual; first the adult or knowledgeable peer controls and guides the child's activity, but gradually the adult and the child come to share the problem-solving functions, with the child taking initiative and the adult correcting and guiding when she falters. Finally, the adult cedes control to the child and functions primarily as a supportive and sympathetic audience.

Implications of the constructivist approach to the teaching of Higher-Order Thinking Skills?

The interest to teach thinking skills has been with educators for a long time. Although it has been handled in many forms for a long time, it only

appeared in the explicit agenda of schooling in the recent times. In this respect, Fogarty and McTighe (1993) trace the development of the teaching skills movement, in particular in the United States, and place it into three phases. In the first phase, that is in the early 1980s, the idea of teaching thinking skills to all students (not just the gifted) was some what new. Skills were taught within familiar content and practiced frequently before they were used in other content areas. The focus in this early stage was on developing some level of basic knowledge and student competency in using a targeted number of thinking skills.

In phase 2, proponents of cognitive instruction focused on the broad critical and creative macro-processes of thinking necessary for problem-solving, decision making, and inventing. Emphasis was on active processing of information through reasoning within subject areas rather than through decontextualized, “content-free” thinking skills activities. They conclude that the final or contemporary status of the thinking skills movement, i.e. the Phase 3, builds on Phases 1 and 2 but extends the application level and is characterized by metacognitive reflection about learning. The focus on the thoughtfulness which is fostered in the integrated, holistic designs of curriculum and instruction has gained much attention now.

It can be noted that, the developments in the thinking skills movement has laid the foundation for at least two general approaches to the teaching of thinking skills. The direct instruction in thinking, which could also be termed as the teaching of thinking, and the use of methods which promote thinking in curricular contexts, which could be termed as teaching for thinking. The teaching of thinking by direct instruction means that, in a time period designated for thinking instruction, students learn how to use explicit thinking strategies, commonly guided by the teacher (Swartz and Parks, 1994, pp. 8). Usually the teaching of thinking occurs in separate, self-contained courses or programs with specially designed materials and is taught outside the standard curriculum.

Whereas, the teaching for thinking involves employing methods to promote students’ deep understanding of the content. Such methods include using cooperative learning, graphic organizers, higher order questioning, Socratic dialog, manipulatives, and inquiry learning. While students may respond thoughtfully to the content, no thinking strategy is taught explicitly. The product (student answers), rather than the process (student thinking), is the focus in these lessons.

More recently, a third approach which possesses the characteristics of both the methods in use has been identified to teach thinking skills, and it is called the Infusion Approach. Infusing critical and creative thinking into content instruction blends features of two contrasting instructional approaches that educators have taken to teach thinking. Infusion lessons are similar to, but contrast with, both of these types of instruction (Swartz and Parks, 1994, pp. 8). These lessons are crafted to bring into content instruction an explicit emphasis on skillful thinking so that students can improve the way they think. Classroom time is spent on the thinking skill or process, as well as on the content. Infusion lessons feature a variety of effective teaching practices that characterize the way thinking is explicitly emphasized in these lessons.

In order to facilitate HOT skills in students, teachers must create an environment in which students feel comfortable sharing their ideas, inventions, and personal meanings. Teachers should engage in specific, powerful practices that communicate to students the essence of thoughtfulness: that their ideas are important and that being open to others' ideas helps us learn (Barrel, 1991, pp. 60). It will be a fallacious conclusion to say that the various types of thinking important to learning are being well covered (Marzano, 1993). In fact Marzano suggests that, some of the most powerful types of thought are not strongly addressed in the classroom.

Barrel (1991) identified at least three aspects which could make classrooms to invite thoughtful participation. First, are belief in one's ability to think and solve problems, the development of an internal locus of control, and the resultant disposition to persist. Second, is openness to other person's ideas, listening, and cooperation. Finally, an absolute essential element for the creation of an invitational environment - is control shared between students and teacher.

In the same respect, Onosko (1991, quoted in Onosko and Newmann, 1994) believe that, "The barriers to create thoughtful learning environment are rooted in five main sources: a view of teaching as knowledge transmission, a bloated curriculum, teachers' low expectations of students, an intellectually oppressive organizational structure, and a culture of teacher isolation". School reform activities and measures designed to increase classroom emphasis on higher-order thinking should begin with awareness of the persistent barriers or obstacles to its promotion.

In goal setting for example, when students do set goals for their own learning, they profit by improving their achievement levels, developing more of an internal locus of control, and becoming aware of their own problem-solving capabilities. "The extent to which students see themselves as a cause of their own behavior may be the single most important determinant of continued motivation" (Thomas, 1980, quoted in Barell, 1991). Teachers will have to present situations, conflicts, dilemmas, questions, problems that will cause students to initiate an inquiry process - that is they begin to question and pursue meaning and/or solutions. This will go a long way in empowering students to pose some of their own dilemmas and work toward solution. This will pave the path towards using an explicit constructivist approach to teach HOT skills.

Partly due to the interest to involve the students more in the teaching and learning process and to identify yet another approach, there is a considerable amount of interest being shown in the teaching of HOT skills using the constructivist approach. It is not however a completely new approach to teaching, and in particular to the teaching of HOT skills. As Glasersfeld (1995) suggests, "Constructivism does not claim to have made earth- shaking inventions in the area of education; it merely claims to provide a solid conceptual basis for some of the things that, until now, inspired teachers had to do without theoretical foundation". This is basically an emphasis on learning involving active construction by the learner, having as a source the learner's own experience, with the teacher playing a facilitatory role providing appropriate situations, tasks, and conditions (Becker and Varelas, 1995, in Gale and Jerry, 1995). In particular,

‘understanding’ as achieved through an activity that students have to carry out themselves and that no one else can do for them.

The instruction in the schools should be geared towards providing thoughtful learning environments in the classrooms in the teaching of HOT skills which promote students’ active construction of their meaning, with the teachers playing the facilitatory role. Usually teachers present the problems, but we are striving for students’ being empowered to pose some of their own dilemmas and work toward solution (Barell, 1991). This does not mean that the teacher has no significant role to play in the teaching and learning in the classrooms. Rather, his role is less that of a person who gives ‘lessons’ and is rather that of someone who organizes situations that will give rise to curiosity and solution-seeking in the child, and who will support such behavior by means of appropriate arrangements. However, teacher will have to overcome the conflict between allowing children to pursue their own meaning and facilitating the construction of meanings and procedures compatible with those of the wider society.

Another concern, which was also a major concern for Vygotsky, is how to conceptualize the interaction between the understandings already achieved by the learner and the further cultural achievements brought to the learner from outside. In teaching HOT skills using the constructivist approach, the teacher will have to decide on the ‘take-off point’ for his or her students. The interaction could take two directions (Becker and varelas, 1995). In the first class, the learner makes the cultural achievements brought to him or her from the outside (the top-down component) meaningful using the understandings that he or she brings to the interaction (the bottom-up component). The other approach could be, the learner reorganizes the concepts that he or she brings to the interaction (the bottom-up component) rendering them more systematic and volitional using the nature of the cultural achievements brought to him or her from the outside (the top-down component).

It is important to note that, no one particular approach can be said of being the ‘best’ constructivist approach to teach HOT skills. However, it is the duty of the teacher to use the appropriate approach which is both useful to the learner and which motivates he or she to participate in the teaching and learning process. Vygotsky’s zone of proximal development could be a tool for the teachers to over come this problem and to plan the instruction in the classrooms. Vygotsky’s conception of the zone of proximal development is precisely an articulation of the notion that the practice of teaching - the practice of assisting a learner’s construction of knowledge, and in this case the teaching of HOT skills, is the bringing of the cultural knowledge to the learner and the bridging between the top-down and bottom-up components, thus allowing the learner to develop new concepts and a new organization of knowledge.

For example, in a class where a teacher wants to teach the skill ‘uncovering assumptions’, the teacher will have to create opportunities for students to learn to uncover assumptions and determine whether or not the assumptions are justified. They will consider actions, determine what is taken for granted in those actions, identify evidence that the person actually made the assumption, and decide whether the assumption was supported by good

reasons. The teacher could focus on the role of cultural differences in determining the outcome of a decision. Again the real challenge for the teacher is, to determine which particular approach or a correct combination of the approach he or she is going to take. That is the learner makes the cultural achievements brought to him or her from the outside (the top-down component) meaningful using the understandings that he or she brings to the interaction (the bottom-up component) or the learner reorganizes the concepts that he or she brings to the interaction (the bottom-up component) rendering them more systematic and volitional using the nature of the cultural achievements brought to him or her from the outside (the top-down component).

At least two steps in this teaching and learning process become critical for achieving the goal of this lesson. First, is to create an environment for the students to explore more about ‘what’, ‘why’, and ‘how’ about the assumptions. Questions like, what are you thinking about doing that might be based on an assumption, what would you be assuming if you did that, why do you think you make that kind of decisions, and how can you find out whether the assumption is correct or incorrect, can be of help and be a guide to the teacher to involve the students in the learning process.

The next thing will be, deliberately creating opportunities for students to think about their own thinking processes, which could be also termed as the ‘metacognition’ level. This stage will provide opportunities for students to revisit and evaluate their own decisions and thinking processes. Questions like, what questions did we ask as we did this kind of thinking, and is it a good idea to uncover assumptions: why or why not, could be of help to the teacher in the class. Both this questions could be approached by drawing on the cultural experiences of the students.

It is also important for the teacher to make sure that the meaning making of the students attain the higher-level of reasoning. That is, creating opportunities for the students, who will be able to draw on their on cultural experiences to participate in activities which are at the synthesis or evaluative level. While bringing the reasoning to the level of synthesis and evaluation represents the categories proposed in the taxonomy of educational objectives by Bloom et.al, efforts could also be made to use the two developmental strands proposed by Vygotsky.

Vygotsky’s view was that there are two developmental strands: the natural (elementary, organic) one and the cultural (higher, social) one (Confrey, 1995). Vygotsky saw the natural strand as dominating early, elementary, more primitive development, and suggesting that there is a transition during which sociocultural influences become of primary importance. This could be a guide for teachers to bring their lessons to a higher-level of cognition. This will make the approach to teach HOT skills, besides being constructive, orientate the students to analyze, synthesize, and evaluate their own thinking processes which provides them with the opportunities to acquire HOT skills.

For Piaget, higher cognitive functions lie in the arena of logical, mathematical knowledge (i.e., knowledge that comes from understanding the actions carried out on objects through a process he called ‘reflective

abstraction'). One example is how the order of counting a set of pebbles evolves from actions; it does not lie in the stones themselves, but evolves from the counting action carried out on the stones. This awareness is called reflective abstraction, and it is the basis of higher cognitive functions for Piaget. For this reason, Piaget located the development of higher cognitive functions in the development of logical thinking, the construction of object characteristics, and in an understanding of such global constructs as space, time, and number.

Teaching and Learning in Malaysian Classrooms: Do They Enhance the Acquisition of Higher-Order Thinking Skills?

It seems important to investigate whether there are efforts by teachers to promote the acquisition of higher-order thinking skills by their students? Do teachers attempt to employ approaches, strategies and techniques which have positive aspects. Do the approaches promote active student participation, allow for students' questions and explorations, cater for the less able in their classes so that they too could benefit from the teaching and learning, and allow students to be part of the teaching and learning processes including playing their part in deciding the task to be carried out?

Although better thinking among students could be a by-product of many activities prepared for the teaching of Malay or English Language, one wonders whether these teachers are making explicit attempts to emphasize thinking skills in their teaching, in line with the recent reform efforts in schools in Malaysia. Also, are these teachers bringing the activities in their classes to a level which possesses distinctive features from traditional approaches to teaching, and clearly promote higher-order thinking skills in their classrooms?

Teacher and student talk

In every lesson Ambiga and Aishah (teachers in this study) allocate time to talk to students. Also an analysis of structures of lessons in both Aishah and Ambiga's classes suggest that a considerable amount of time is allocated by the teachers to do this. In Ambiga's classes, this teacher talk could be in the form of the teacher explaining a topic like 'ants,' introducing grammatical aspects like 'prepositions,' and explaining meaning of words from the passage. In any one given lesson, at the minimum there will be teacher talk explaining the task of the day after which students do the writing assignments. Student talk in Ambiga's English Language classes could be in the form of students providing responses while reading a passage, presenting the outcome of their group discussions to the class, and students' questions. Almost similar type of teacher and student talk takes place in Aishah's classes. One difference seems to be that Aishah provides opportunities to students to narrate their personal experiences to the class. This, however, only happens in the higher level Malay Language class.

A close look at the interaction between Ambiga and her students in the lower level English Language class (Class observation, 52I63) provides data to

understand the pattern of talk between the teacher and the students. Teacher is introducing a number of words, and also is interested in correcting students' pronunciation. Although the turn taking is equally divided between the teacher and the students, the teacher is doing more talk in terms of time taken than the students. It is important to note that there is not even one question asking students, "Do anyone of you know this word (s)?" Teacher talk involves long explanations, but student talk is limited to repeating words in chorus. Although there are students in this lower level English Language class trying to contribute towards what they are learning, the teacher does not seem to exploit students' input to the maximum. For example, when the teacher introduces the word 'rawatan' (treatment), a student, before even she calls for an answer, provides the response by saying 'treatment.' She seems to just go forward by getting students to say the word. She doesn't even explain the word, as she explained the words 'huge' and 'parcel.' Requesting students to explain the word 'treatment,' instead of her explaining may provide opportunities for student talk and would also enrich the discourse.

Amb :Yang ini adalah bungkusan [This one is parcel], we call it parcel.
Ss :Parcel.
Amb :Parcel.
Ss :Parcel.
Amb :This one is rawatan [treatment] ye.
S1 :Treatment.
Amb :Treatment.
Ss :Treatment.
Amb :Treatment.
Ss :Treatment
Amb :Ok. Ini bukan 'patent' [This is not patent]. Patent tu maknanya lain ye [Patent means a different thing, ok].
S1 :pe-ti-ent
Amb :Bukan [not] 'pe-ti-ent'. Dia punya sebutan [the pronunciation is] 'patient'.
Ss :Patient.

(Class observation, 52I63)

She goes on to explain the next word 'patient.' She starts to explain, 'This one is not patent, ye', even before asking whether any of the students know the meaning of the word or even how to pronounce it. She seems to assume that none of the students in the class knows the word 'patient.' She also seems to remind the students that 'patent' and 'patient' are two different things, but did not make an attempt to explain the difference. Also, to make things more interesting for students she could have used any one of the students to explain the meaning of the word 'patient.' This pattern of interaction seems to limit student talk and student participation in the class. What seems important to note here is that for effective learning to occur there needs to be both equal number or more turn

taking for students to talk, and also the quality of the talk that goes on in the discourse.

A similar scenario seems to be present in Aishah's classes. Below is an excerpt of an interaction between the teacher and students in the lower level Malay Language class. The teacher and students are talking about transitive and intransitive verbs. The teacher asks a question, "what is the meaning of a verb?" A student answers, "A verb is a word which shows an activity." It needs to be noted that, although this is a lower level Malay Language class, students are ready to provide responses. The answer for the meaning of a verb is in a full sentence, unlike in most cases where students are fond of giving one word answers.

Ais :Nuzrul, what is the meaning of a verb?
Ais :Yes. Razak.
Razak :A verb is a word which shows an activity.
Ais :Activity ye. So, a verb is part of a category of words. One category of words showing an activity. So, a verb is something which is carried out. It shows an activity or someone involving in an activity. That is what called a verb. In Malay Language, we have two types of verbs. Ok, who can give one of the verbs? Remember, in Form One, I have explained.
S1 :Transitive verb.
Ais :Yes. a transitive verb. Ok, the second one?
S2 :An intranstive verb.
Ais :Ok. an intransitive verb.
Ais :Ok. In the text book, this is called intransitive verb.....

(Class observation, 52E11)

She seems to feel happy about explaining the meaning of what a verb is, and later about an intransitive verb, when in fact the students seem capable of explaining many of those terms themselves. For example, when one of the students provided the answer 'intransitive verb,' she did not make an effort to ask whether any of the students knew what an intransitive verb is. There could have been an opportunity for student talk. She instantly started to explain what an intransitive verb is. Even when the student Razak provided an answer for the word 'verb,' she did not attempt to expand the answer by requesting him or other students to contribute. One way to get students to think and wonder about what they do in their classes, may be, is to contemplate the responses provided in the classes. This does not seem to be happening here.

In one of the problem solving activities in the English Language classes taught by Ambiga, students presented what they discussed in their groups (Refer to Appendix B - Table 22 - Day 5, Lower Level English Language class). Students had the opportunities to talk about the six things they had decided to bring with them from a troubled plane. Ambiga did ask them to explain why the passport is one of the six things they selected. This particular activity obviously provided students the opportunities to talk about the 'why,' in small groups, besides the 'what.' However, continuing the discussion about the 'why,' and

allowing students to talk why it qualifies to be one of the six items seems to be the kind of activity which could provide the opportunities for student talk involving higher cognitive operations. Among others, students need to be encouraged to make judgments about purpose, worth, or quality of something.

S1 :Passport.
Amb :Say why you need the passport.
S1 :Because we are Malaysian citizen.
Amb :We are Malaysian citizen. Ok. Next.
S1 :Matches.
Amb :Matches.
S1 :Because we can, we can smoke signal.
Amb :Ok. Signal, how?
S1 :Because when we see someone, we can give signal.

(Class observation, 52I53)

There may not and will not be six correct answers for this problem. However, getting students to talk, argue, criticize, and debate these issues would provide them the opportunity to carry out some higher-level thinking themselves. Over time, this kind of exercises may prove useful in educating students to conduct higher-level thinking on their own. Another example from Aishah's higher level Malay Language class demonstrates how the teacher summarizes a discussion between her and the students. Even here the teacher seems to be the one who is talking more than the students which limits opportunities to students to talk and summarize the discussion. Even if students get to talk, they seem to give one word answers to reaffirm what the teacher is saying.

Ais :Ok, so from this passage, we understand, how a student, Bainum binti Shukri, ...part of her contributions is to be given to .... Actually, the student Fairus pretends to use part of his savings to buy a series of books which he likes. ...sympathize...what good values do you all see here? The good things, which needs to be followed or Fairus' attitude?
S1 :Kind heartedness, teacher.
Ais :Kind heartedness.
S2 :Sympathy.
Ais :Sympathy.
S3 :Not only thinking of ourselves.
Ais :Not only thinking of ourselves.
S4 :Cooperation.
Ais :Is it?
S4 :Cooperation
Ais :Cooperation, so more...?

(Class observation, 52B32)

Students proposed good values like kind heartedness, sympathy, and cooperation for a question what could be learned from Fairus' attitude. There

could be many students in the class who do not understand the meanings of these values, and more importantly how they relate to the main story they have been discussing. Talking about them and also providing opportunities to students to explain the values they proposed and also to play a part in summarizing the lesson may have provided the students with the opportunities to do some higher-order thinking about their learning task of the day. Synthesizing the many points raised in the class seems to be one of the activities need to be promoted in a class where improving students' thinking is one of the learning objectives.
In all the four classes, the two teachers allocate substantial amount of the time for talk, but it seems that much of the time is used for teacher talk than to encourage student talk. The kind of common practices involving teacher and student talk in the four classes (Refer to the Appendix B - Table 22), suggest that teachers control and dominate the discourse, even when students could be allowed to talk and extend the classroom discourse. A further investigation of the small group discussions in the classes may help understand further how those small group discussions did or did not help to promote student talk and higher-order thinking skills among them.

Small group discussion

The small group discussions provide opportunities for students to talk about issues at hand. Students solve problems, clarify values, explore controversial issues, and form and defend positions during reflective discussions (Wilen, 1990). This discussion where students are required to synthesize and evaluate information, opinions, and ideas has the potential to push students to the highest levels of cognition.

From the observations of the two English Language and the two Malay Language classes and the Table 1 below, it could be seen that there were small group discussions in all classes except for the higher level Malay Language class. There were small group discussions in two of the five days in the lower level English Language class, whereas there were small group discussions in two of the six days in the higher level English Language class. However, there was small group discussion in only one of the five days in one of the classes taught by Aishah. There were no small group discussions on any one of the days in the higher level Malay Language class.

Table 1: The usage of small group discussions

in the Malay and English Language classrooms

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Total
Higher Level							

Eng. Lang. class (2A)				X	X	------	2
Lower Level Eng. Lang. class (2I)					X	X	2
Higher Level Malay Lang. class (2B)						------	0
Lower Level Malay Lang. class (2E)				x		------	1

On the two occasions Ambiga had small group discussions in her classes, she involved students in small group discussions to find ways to solve a given problem and working in pairs to prepare a dialogue. In her higher level English Language class, students had to discuss and find reasons why the couple were arrested in the problem solving activity, and also got to work in pairs to prepare dialogue based on two situations given by the teacher. These were similar kinds of activities which she carried out in both of her English Language classes. Aishah, on the other hand, does not seem to be using much of small group discussions in her lesson structure. The only time she used was when she requested students from the lower level Malay Language class to prepare questions on an episode of a drama they read in the class. Students worked in pairs. Although students from a higher level Malay Language class suggested that Aishah requests students to be in small groups and ".. when we are doing our essay, she asks us to gather points for the essay." and also suggested that, "after that we discuss about the essay" (Student interview, 5S3A3), this did not seem to have occurred in the classes during the period of this investigation.

Raj :Does your teacher get you all to discuss in small groups in the class?
Ss :Yes.
Raj :Could you all explain when you get to do this?
S5 :Like when we are doing our essay. She asks us to gather points for the essay.
S6 :After that we discuss about the essay.
Raj :Ok. Who else can explain?
S2 :We look for views.
Raj :When you all look for views, how do you all do that?
S3 :We discuss as a group.
S4 :Everyone gives his points or views.
S6 :But sometimes there are students who make noise, play, do not want to do, or sleep.
Raj :So, there are people who wouldn't do?
Ss :Yes.
Raj :Are there such people in all groups?
Ss :Yes.

(Student interview, 5S3A3)

The students seem to like discussions in small groups, although there seems to be problems like those mentioned by students above where there are students who do not contribute, make noise, or sleep. The few times students were observed in small groups to discuss in three classes, except the higher level Malay Language class, students were very excited and showed a lot of interest in participating in the discussion. When students in Ambiga's class were asked whether the discussion in a group is interesting, they seem to suggest that they like the discussions, and they would like to have more of it (Student interview, 5S1B2). They also suggested that the discussions are sometimes challenging, besides being interesting. They claim that because the task given to the group is challenging, it makes them think (Student interview, 5S1A4).

It seems that if the tasks given to the students are interesting and challenging students will have serious debate in the small group discussions. When students did the problem solving activity, and as a part of the activity they had to discuss in small groups, Ambiga suggests, the students did discuss about many interesting aspects like, "Why this couple [were] convicted? Why? Then the other sense is like.., you read this la…, open window and all. So they.., one couldn't see what the other can. So they do that kind of discussion till they found out" (Teacher interview, 7T1B14).

Raj: Inference questions, ya. OK. Let's.., we go into the writing assignments. You give both the classes writing assignments. Group writing assignments they did. Remember, they wrote on the..,

Amb: Ah.. ya.

Raj: So for 2A they wrote all the reasons, and 2I they wrote the six things they can take with them. And then they came up, they presented. When they discussed and wrote that in groups, do you think that they had to think about that? Think about why they need to choose this and not that? And why they make a decision on the reason convincing.., not others?

Amb: While they're discussing?

Raj: Yes, while they're discussing. Sure they have to think about that. Otherwise..

Amb: Ya, ……. When I go around to ……. They, what is this? Why this couple convicted? Why? Then the other sense is like.., you read this la. Macam mana ada buka tingkap [how could they open the window], open window and all. So they.., one couldn't see what the other can. So they do that kind of discussion till they found out.

Raj: Sure, especially when they want to put on writing, it's more than just talking.

Amb: Yes. they have to really put it like.., otherwise the other group. Then..,

Amb: And then, I think one or two groups found out that there's a contradiction in statements. Because they start asking me, calling me up and said there's something wrong with this statement and this statement. They couldn't figure out what. So I just see and

this.., certain things very contradicting. So I see, ah.. ya. The wife said something else and the husband said something else.

Raj: In that writing exercise, do you think there were opportunities for students to state their thoughts. Related to that topic, but they can bring in their own thinking.

Amb: Bring in their own thinking, I mean outside the.., the..

Raj: But related to that topic. What do you think? What is the opportunity?

Amb: There will be.

(Teacher interview, 7T1B14)

Students also found out the contradictions in statements given by the couple to police, and they talked about it. Ambiga also suggested that students called the teacher and asked her questions when they found contradictions. She also believes that since they were requested to write reasons later, there was a more serious discussion. When this kind of discussions take place in small groups, then students get opportunities to make inferences, analyze the issue, synthesize the various perspectives given by different students, and make conclusions.

Small group discussions have the potential to contribute towards student learning in terms of their ability to analyze, synthesize, and evaluate information. They can also make their own judgments after having done those processes. It seems that the few times small group discussions were used in the English Language class, it motivated the students and provided the opportunities to them to engage in higher cognitive level thinking. It also seems that it is important for Ambiga to increase the frequency of the usage of such small group discussions in her classes. In the case of Aishah, she needs to understand the potential of small groups discussions and include that in her lesson structure as often as possible.

Problem solving strategy

Observations of the teaching and learning in the form two Malay and English Language classes suggest that there are certain strategies like problem solving which have the explicit potential to promote thinking skills among students. Besides being good language activities, they provide the opportunities to students to think hard on issues to solve the problem at hand. However, this problem solving strategy was only used once in the two of Ambiga's two English Language classes. It was not used at all by Aishah in her classes during the period of this investigation which was for two weeks in each of these classes.

Ambiga gave two separate problem solving activities to her two classes. She suggested that she prepared two separate activities based on students' abilities, because one (Form 2A) is the best form two class and the other (Form 2I) is a lower level class. Furthermore, since she is teaching English Language,

she suggested that she needed to have relatively an easier activity for Form 2I. The English Language proficiency of students in Form 2I was very low.

For Form 2A (Day 4), the higher level English Langauge class, she prepared a problem solving activity called ‘Robbery on a stormy night’ (Class observation, 52A4). Students were requested to read a passage about a couple who worked at a supermarket, and were apparently robbed of the cash by two gunmen on a stormy night at a traffic light. When they reported to the police the next day, the constable, after listening to the story, said, “Well then, you’re both under arrest. You are charged with robbery.” The students were requested to get into groups and discuss why the police constable put the couple under arrest. The students were asked to present their reasons to the whole class.

For Form 2I (Day 5), the lower level English Language class, Ambiga prepared an activity where the students were asked to get into small groups and discuss to solve a problem. They were given a total of 19 items which the teacher wrote on the board. They were told to pick only six items before they could jump out of plane which has engine trouble and would crash anytime. The items included passport, camera, matches, cigarettes, pen knife, transistor radio, medicine, and a story book. Ambiga told the students to discuss which six items they would want to bring along after explaining each of the 19 items. They were also requested to present their six items to the class.

The problem solving strategy used by Ambiga seems to have really excited the students about the problem they were asked to solve (Class observation, 52I5, 52A4). It could be seen from the observations of the classrooms that both when they were discussing the problem in small groups and when they presented, the students, including those in the Form 2I class, seemed very excited. They were very eager to talk. They were trying to ask questions to the friends who were presenting in front of the class. In Form 2A, for example, there were students who seemed interested in asking questions to those who presented in front of the class. There seemed, however, no accommodations for students’ questions in the structure of the lesson. The teacher too seemed quite unaware of some students’ eagerness to ask questions. As a result, they lacked the opportunities to ask questions. When they could not ask those who were presenting in front of the class, there were students shouting, “Teacher you believe that?” (Class observation, 52A4). There were also students shouting, ‘How does the robber know they had the money?’ (Class observation, 52A4).

These questions seemed so important for the students to discuss. Also in the Form 2I class, there were students interested to know why, for instance, some of the groups selected items like cigarettes. They seemed to have a problem believing that someone will take cigarettes along when someone is in an emergency situation, and also when one is allowed to take only six items. There seemed to be no explicit attempts by the teacher to promote such questions. These questions, if they were discussed by the students, would have obviously provided them the opportunities to conduct some high level thinking about the problem, for example, critically evaluating opinions and suggestions.

The problem solving activities Ambiga prepared for her two form two English Language classes were without doubt positive attempts to create

opportunities for students to engage in higher-order thinking. The students seemed to have liked the activities and were eager to participate and contribute. They also had questions which, if had been entertained, would have led to higher-level discussions in the classes. In fact, Ambiga when explaining the task, especially to Form 2I, did not specifically stress the point for students to discuss why they are selecting the six items (Class observation, 52I5). As such, the problem of discussions on the problem solving activities not going to a higher-level may be rooted in the lack of awareness on the part of the teacher herself. However, the problem solving strategy used by Ambiga in her two classes showed a lot of potential to promote higher-order thinking skills in her English Language teaching. The important point is that there needs to be more of such activities in her classrooms. In the case of Aishah, she needs to understand the importance of using such strategies and use them as often as possible in her Malay Language classes.

Questioning technique

Questioning technique seems to be used quite extensively in Aishah and Ambiga's classes. Teachers very often seem to employ this technique as a way to involve the students, and to break the monotonous 'rhythm' of only they speaking in the class. This often seems to take place when they dominate the discourse and are teaching a new concept or introducing a new learning component. Although the questioning technique is often used in these classes, the question is whether the questions asked are eliciting responses which grow out of their higher thinking processes, and whether the responses are again expanded to provide opportunities for students to carry out higher-order thinking.

Amb :When you read about the ants, what do you think about the ants?
Ss :Hardworking.
Amb :Hardworking.
S1 :Bites.
Amb :Bites. Ok. Others.
S2 :Help each other.
Amb :Help each other. Yes. .Lain [Others].
S3 :Cooperative.
S4 :Loyal to the queen.
Amb :Loyal..Loyal to the queen. Ok. Next.
Amb :What do you know about ants? Some of you might know little bit about ants. So..share with ...We have 'loyal to the queen.' What else?

(Class observation, 52A11)

It could be seen from the interaction above that even in the higher level Form 2A English Language class, where the students are eager to participate and provide responses for the questions the teacher is asking, the teacher seems not to be using student responses effectively. The students gave a

number of things they think about when reading about ants. In fact, that is what the teacher wanted the students to share. Their responses like hardworking, bites, help each other, cooperative, and loyal to the queen suggest that the students do have a good knowledge of ants. The students seem to have the knowledge about each of the phrases they told the class.

But unfortunately, Ambiga did not seem to ask any of the students to explain the phrases they were sharing with the class. Asking the student who said, 'Loyal to the queen,' explain what he meant by that may have helped the class to contextualize their thoughts about the topic they are learning on that day. Students may also have had the opportunities to connect this information of ants being loyal to the queen to what they might already know of ants. Extending the discourse with more questions and responses both from the students and the teacher may have created an opportunity for students to know about ants which they were to read from the passage. This discourse may have been the very core of the lesson of day because the reading passage Ambiga brought to the class included many of the aspects the students told the class as a result of her questions.

A similar scenario seems to be present in Aishah's class (Class observation, 52B18). She too seems to be using the questions to break the monotonous rhythm of her teaching. She is teaching a grammar component, transitive and intransitive verb in her higher level Malay Language class. The curricular documents available to teachers encourage such grammar components to be taught in an integrated manner. That is they need to be part of other language activities and they need to be taught in a context, and taught in the direct and disintegrated manner as Aishah is doing.

S1 :Ahmad is..studying.
Ais :Ahmad is...., Ahmad is..studying. Ahmad is studying. Studying is a transitive or intransitive verb?
Ss :Transitive.
Ais :What??
Ss :Intransitive.
Ais :Intransitive. Good. Can that sentence be broken into two parts?
Ss :Can.
Ais :Can??
Ss :Cannot.
Ais :Cannot. Ahmad is reading. If you break it....that sentence cannot be broken. Ok. Others.

(Class observation, 52B18)

Here, Aishah is telling students about the different kinds of verbs, which in her opinion, is new information. In the process, she seems to be using the questions to get students to say what she wants to hear, and also to reaffirm what she is saying. She seems to be taking the responses that she would like to hear. She seems to just leave the responses hanging if they are not what she wants. For both the responses she wants the students to say, or what the

students say by themselves, she does not seem to make an effort to use these responses to engage the students in a discussion or some serious thinking.

When she asked a question whether studying is a transitive or intransitive verb, the students answered, 'transitive.' He response for this was, 'What?' Her response seemed to have sent a message to the students that, the answer is not right. Next, the students gave a response which could not be anything other than, 'intransitive.' Aishah's response this time is, 'Good.' Similar thing seemed to have happened when she asked the students whether that sentence can be broken into two parts. When the students said, 'Can,' she asked, "Can??' This again, seemed to have sent a message that what the students said was wrong. Next, the students said what she wanted to know, that is 'cannot.' There seems to be no need for students to do any kind of serious thinking to figure out the 'correct' answer.

The kind of responses elicited from students largely depend on the quality of questions posed by the teachers in classrooms. If they are low cognitive levels, that is requiring students to recall or restate information already provided, then one ends up getting such responses. On the other hand, if the questions posed by the teacher require students to critically evaluate information or to make a judgment, then one could expect such kind of responses from students. In this respect, an analysis of questions and responses from Ambiga and Aishah's classes were conducted.

The analysis in Table 2 is on the interaction between the teacher and students in the higher level English Language class where they were talking about 'ants' the topic of the reading passage the students were going to read. The interaction between the teacher and students went on for 18 minutes, after which the students read the passage and did the writing assignment. This is one of the rare times when the teacher and student interaction went on for 18 minutes which is about one-third of the class time. There was active participation from students in providing responses.

Table 2: Classification of Teachers' Questions and Students' Responses based on Bloom's Taxonomy of Educational Objectives

Cognitive levels of questions	1	2	3	4	5	6	Total
Teacher's Questions	26						26
Students' responses	30						30

Key:
Higher Level English Language class
Form 2 A: Day 1 (2/25/97)
Total time of the class : 1 hour 10 minutes
Total time of interaction and analysis: 18 minutes

There were a total of 56 turns in this segment. The teacher had 26 questions, and the students had 30 responses. An analysis of the questions and responses (Table 2) suggests that the questions and responses are all of the first category in the Bloom's Taxonomy. The categories were decided on the kind of responses they intended to elicit. Teacher's questions required students to name, list, recall, or repeat information previously stored, which is the first cognitive level in Bloom's taxonomy. Teachers' questions included, "What do you know about ants?" and "What do you call the black one?". Most of the responses were one word answers. Students' responses included, "Hardworking," "Cooperative," and "Loyal to the queen." There were no attempts to extend the responses from students. Very often they followed the IRE (i.e., Initiation, Response, Evaluation) sequence. In other words, there was a question from the teacher for which there was a response, and the teacher evaluated the response. Since there were no speculation on the responses, and also because teacher's questions basically requested students to recall or repeat information, all of students' 30 responses were at the lowest level of cognitive operations. Students basically had to rely on their recall, relocate, and restating abilities.

The analysis in Table 3 shows the type of questions and responses in the interaction between the teacher and students in the higher level Malay Language class. This interaction went on for a total of 25 minutes (Refer to Appendix E - The interaction between the teacher and the students), after which students were introduced to a poem and later copied the poem in their books. This interaction also represents one of the rare opportunities where it went on for about one-third of the class time. There were a total of 108 turns in which the teacher and students shared equal number of turns. In this interaction, the teacher is introducing a grammatical component, 'verb.'

Table 3: Classification of Teachers' Questions and Students' Responses based on Bloom's Taxonomy of Educational Objectives

Cognitive levels of questions	1	2	3	4	5	6	Total
Teacher's Questions	41	9	4				54
Students' responses	37	10	7				54

Key:
Higher Level Malay Language class
Form 2 B: Day 1 (3/11/97)
Total time of the class : 1 hour 10 minutes
Total time of interaction and analysis: 25 minutes

Teacher's questions were of the first, second and third levels in the Bloom's taxonomy. Likewise, students' responses were also of the same three cognitive levels. The number of students' responses in each of the categories also seem to almost follow the teacher's questions in each of the categories. The categories were decided on the type of responses intended to be elicited from students. Teacher's questions were of three categories. They included, "How many types of verbs are there?" (Level 1), "Why is it that this is an intransitive verb?" (Level 2), and "Ali kicked the ball. Ok. In this sentence, where is the verb?". Students' responses included, "Two types" (Level 1), "Because they do not need an object" (Level 2), and "Kicked is the verb" (Level 3).

This seems to suggest that there is a close relationship between the cognitive levels of teacher's questions and students' responses. Unlike the situation in Ambiga's class, here students provided responses at the third level where they had to apply the information learned to provide new examples. They even tried to summarize what they had learned in the discussion. Students suggested, for example, that intransitive verbs do not need objects in the sentence. In other words, if teaching higher-order thinking is one of the objectives, then teachers need to ask more of higher level cognitive level questions.

Infusion approach

Teachers in Malaysian classrooms are expected to use the infusion approach to teach higher-order thinking skills in their content instruction. In infusion lessons, direct instruction in thinking is blended into content lessons (Swartz and Parks, 1994). There are five steps in the infusion approach: introduction to content and process; thinking actively; thinking about thinking; consolidation or enrichment activities; and applying thinking (Teacher Education Division, 1994). .

Teachers were requested to state whether they think they have the ability to teach Malay or English Language and higher-order thinking skills using the infusion approach (Table 4). Among the 104 teachers who participated in this study, 42.3 percent of the teachers either agreed or strongly agreed that they are able to teach Malay or English Language and higher-order thinking skills using the infusion approach in their classrooms.

Table 4: Teachers' perceptions of their ability to teach Malay or English Language and higher-order thinking skills using the infusion approach.

	Frequency	Percent
Strongly disagree	5	4.8
Disagree	9	8.7
Neutral	46	44.2
Agree	42	40.4
Strongly agree	2	1.9
Total	104	100.0

The largest group among the teachers, that is 44.2 percent, suggested that they are not sure whether they are able to teach both Malay or English Language and higher-order thinking skills using the infusion approach in their classrooms. The rest of the teachers who make up 13.5 percent either disagreed or strongly disagreed that they are able to teach Malay or English Language and higher-order thinking skills using the infusion approach. An ANOVA test conducted suggest that there was no significant difference (p= .124) between the Malay and English Language teachers in terms of their responses towards teaching Malay or English Language and higher-order thinking skills using the infusion approach. This suggests that for majority of the Malay and English Language teachers using the infusion approach to teach Malay or English Language and higher-order thinking skills was a problem.

Observations of Ambiga and Aishah's English and Malay Language classrooms suggest that there are no attempts to use infusion approach to teach higher-order thinking skills. Even the structures of lessons used by Aishah and Ambiga do not seem to accommodate the five steps suggested for infusion lessons. The only thing which seems to be happening is the first step, that is the introduction of content, which is the language content and not the content of the thinking skills. Even in that, the introduction of process, which needs to be introduced together with content, is omitted. The kind of practices in Aishah and Ambiga's classes do not suggest that there are explicit attempts to involve students in thinking actively, metacognitive process, that is thinking about the thinking process, or applying the thinking skill learned, which are other important steps in the infusion lessons. There were no pedagogical steps to involve students in evaluating their own thinking processes, like thinking about why they did or did not make a particular decision.

Another problem here why one does not find these infusion lesson steps in Ambiga and Aishah is that, they do not seem to make a distinction between the strategies and techniques they are using and the specific steps recommended for infusion lessons. For example, Ambiga suggests that she does not agree with the Ministry's proposal to teachers to infuse thinking skills into content instruction.

Raj: Not of much help. You see like the first thing is you must know what you are supposed to teach. In English Language, yes, you are fine. You have done a four year degree program. But when it comes to higher order thinking skills, I mean …

Amb: How, okay I take a subject. So let's say essay writing. Composition titled 'Solving Social Ills.' So I ask them to base on their own knowledge. Those are the strategies. But I do not know whether

> these strategies I use is called HOT. That's the problem. That is the problem. There's no straight line. I don't know HOT or just one of the strategies. Which one? If they highlight okay, what you are doing now okay you are now on the right track, all the while HOT, no problem. You can go on. But Kementerian (Ministry) is saying like we haven't done this HOT all these while. That's why Kementerian (Ministry) says okay you must infuse in the subject HOT. That's why I don't agree.
>
> (Teacher Interview, 1T1C5)

The reason why Ambiga finds it hard to accept the Ministry's proposal is that she believes the strategies and techniques she is using now are fine for teaching thinking. She is also not sure whether the strategies and techniques she uses could be called higher-order thinking skills strategies. That is suggesting that she and Aishah do not seem to see a distinction between the new strategies to infuse thinking into content instruction and what they are doing now in their classes. Ambiga also seems to oppose the ministry's proposal because she believes that ministry's proposal is coming out of an assumption that teachers are not teaching thinking now.

Summary

Both Aishah and Ambiga seem to be using various approaches, strategies, and techniques in their Malay or English Language classes. They basically seem to use these strategies to teach the Malay or English languages which are the main foci in their teaching. These strategies and techniques are not extended to a level to cater for the acquisition of higher-order thinking skills by the students. However, some of the strategies have shown promise of promoting higher-order thinking skills if teachers deliberately plan and use them effectively in their classrooms. On the whole, it seems that the teachers lack the understanding of the potential of many strategies in promoting higher-order thinking skills in their language classrooms, engaging students in what could be challenging problems, guide student manipulation of information to solve problems, and support students' efforts. Their practices in the classrooms do not seem to suggest that the various approaches and techniques are used effectively in the context of promoting higher-order thinking among students, except in the use of problem solving strategy. .

To be able to use these strategies and techniques with high potential to promote higher-order thinking skills, teachers need to possess the subject matter knowledge and pedagogical skills to combine both the teaching of content and thinking skills. For this, they need to be able to construct the pedagogical content knowledge necessary to conduct the teaching and learning processes in their classrooms. Investigation of how they use or do not use different strategies suggest that Ambiga and Aishah lack at least two of the four categories required

to construct the pedagogical content knowledge, especially for the teaching of higher-order thinking skills (Grossman, 1990). The two categories are, the overarching conception of teaching a subject, that is the teachers' knowledge and beliefs about the nature of the subject and what is important for students to learn, and knowledge of instructional strategies and representations for teaching particular topic. What this entails is that Ambiga and Aishah seem content with their present practices. They do not seem to see the need to change their current practices. Even if they do see the need to change their current practices to promote higher-order thinking skills in their Malay or English Language classrooms, they need to possess the necessary knowledge and pedagogical skills, which they lack now, to construct the pedagogical content knowledge to teach Malay or English Language and higher-order thinking skills together in their own classrooms.

Teachers too do not generally know about using the infusion approach which is expected to be used by teachers to teach higher-order thinking skills in content instruction. First of all, since they do not know about the specific steps to be used, and also the pedagogical skills to use them in their classrooms, it is no surprise that these infusion approach seldom found in these classrooms. There also seems to be a clear dissonance between the type of strategies and techniques Ambiga and Aishah use in their classrooms, which in their opinion is sufficient to teach thinking, and the type of strategies and techniques and the practices which accompany them that promote higher-order thinking skills. This also includes the infusion approach. It could be that teachers like Ambiga and Aishah suggest that they happy with their present practices, and also suggest what they are doing now could be seen as higher-order thinking strategy to avoid being labeled as doing a bad job of teaching in general, and teaching higher-order thinking skills in particular.

Conclusion

Attempts to teach HOT skills using the constructivist approach should not be interpreted as introducing a completely new approach to improve the teaching of HOT skills. It is yet another approach which places a lot of importance on the role of the students in the meaning making process. The students' active role in the meaning making process will further assure the internalization of HOT skills by the students, which is in fact the ultimate goal of teaching HOT skills. Attempts to use the constructivist approach to teach HOT skills should be encouraged and researched further because it seems to complement the efforts to achieve the goals set by the thinking skills movement.

More importantly, the focus so far has been only on the two general approaches to teaching HOT skills. Even the recent effort to introduce the third approach, that is the 'infusion approach' did not specifically handle the issue of students' active role of meaning construction in the teaching of HOT skills. More focus and interest in the area of using constructivist approach to teach HOT skills will certainly contribute to further improve this relatively new effort.

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