HSSE Online 7(1) 27-40

Incorporating Mediated Learning Experience in Geography Lessons

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Abstract

With the recent emphasis on 21st century competencies, inquiry-based learning has been touted as the recommended pedagogy as it attempts to move away from didactic teaching. However, an analysis of the current geography syllabus revealed three possible areas of improvement: (1) lack of intentional mediation of cognitive functions (2) lack of continuous mediation and (3) lack of emphasis on enhancing students' dispositions in learning. From research, inquiry-based learning could be complemented by MLE, a theory developed by Feuerstein which refers to the quality interaction between the mediator and learner. Therefore, the purpose of this research paper is to explore how principles of MLE may be applied to address the aforementioned areas of improvement to enhance students' learning in the geography classroom. Subsequently, a broad conceptualization of how MLE may be utilized to underpin the inquiry-based learning approach will be provided.

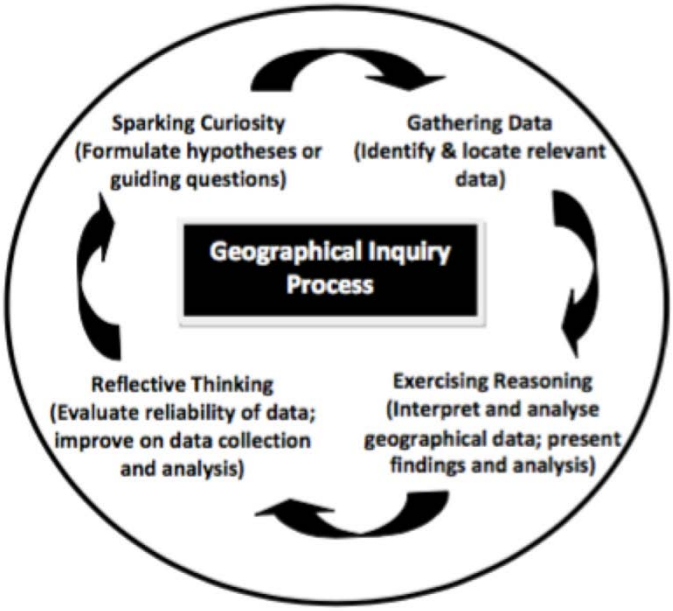
Inquiry-Based Learning as A Teaching Pedagogy

Over the years, revisions have been made to Singapore's education system to better equip students with 21st century competencies to help them succeed in a rapidly changing world (Deng, Gopinathan, & Lee, 2013). One major reform in the education system is the introduction of *Thinking Schools, Learning Nation* (TSLN) in 1997 which is a vision that "describes a nation of thinking and committed citizens capable of meeting the challenges of the… 21st century" (Chang, 2012). In alignment with this vision to develop in students 21st century competencies, the humanities syllabuses adopted inquiry-based learning as the recommended teaching pedagogy (Afandi, 2013).

Geographical inquiry is a question-driven approach in which inquiry questions are asked (either by the teacher or students themselves) and students would subsequently find out the answers to those questions by embarking on an investigation (Roberts, 2013). According to Roberts (2013), the learning of geography through an inquiry approach gives students the opportunity to cultivate thinking skills such as reasoning, classifying information and analyzing data (refer to Figure 1). These skills could either be specific to geography or classified as general thinking skills which could also be applied to other subjects. Broadly, these thinking skills could also be thought of as cognitive functions. Cognitive functions are defined as "process variables that are themselves compounds of native ability, attitudes, work habits, learning history, motives and strategies" (Seng & Tan, 2008). Thus, in essence, cognitive functions refer to a broad spectrum of cognitive capabilities, representing different domains of thinking. Therefore, when teachers utilize the inquiry-based approach to teach geography,

they are seeking to develop and enhance students' cognitive functioning such that students could be equipped with the desired thinking skills.

Figure 1: A graphical representation of the geographical inquiry cycle (Ministry of Education, 2013, p. 118).



Although the introduction of inquiry-based learning represents a commendable shift away from mere didactic teaching, improvements could be made to ensure the further enhancement of students' cognitive functions. These following illustrate the three main areas for improvement in inquiry-based learning:

(1) lack of intentional mediation of cognitive functions

(2) lack of continuous mediation

(3) lack of emphasis on enhancing students' dispositions in learning.

Firstly, to help enhance certain cognitive functions, a taxonomy of Socratic questions (refer to Appendix A) has been provided in the upper secondary geography teaching and learning guide (Ministry of Education, 2013). However, development of cognitive functions would require more intentional mediation in other areas apart from questioning. For example, the mediation of cognitive functions could be made intentional even through the preparation of lesson resources (Tan, 2003). Furthermore, the taxonomy of Socratic questions only provides question prompts for six cognitive functions. This is in contrast to Tan's cognitive functions disc (Seng & Tan, 2008) which lists fifty different cognitive functions (refer to Figure 2). As such, it seems that the taxonomy of Socratic questions may not be sufficiently comprehensive to cover the broad spectrum of cognitive functions.

Secondly, the essence of the inquiry approach lies in the continuous interaction between the teacher and students. Therefore, this implies that teachers have to actively mediate their students' learning and ensure that questioning does not elicit

a mere question-and-response behaviour. However, while the teaching and learning guide provided question prompts for teachers to utilize (as given in the taxonomy of Socratic questions), it might be insufficient as it does not specify how teachers may follow up from these question prompts to continuously engage students in the inquiry process to develop the intended cognitive functions.

Thirdly, the teaching and learning guide seems to lack an emphasis on enhancing students' dispositions in learning. This may result in teachers concentrating their attention on trying to enhance their students' cognition and consequently neglecting the affective domains of learning. It has, however, been acknowledged that developing critical thinking skills does not solely relate to one's cognition, but it is also affected by affective domains (Kraft, Fuhman, Husman, Semken, & Srogi, 2011). Therefore, failing to adequately address students' affective domains in learning would hamper the development of cognitive functions in students.

Theory of Mediated Learning Experience

The theory of Mediated Learning Experience (MLE) is founded upon the concept of "cognitive modifiability". This theory of cognitive modifiability has been supported by a growing body of empirical evidence attesting to the plasticity of the brain (Tan & Seng, 2005), illustrating that human intelligence is a modifiable entity. One such theory that supports the modifiability of cognition is Feuerstein's theory of Structural Cognitive Modifiability (SCM) which states that "all human characteristics, including personality, cognition and behaviour are modifiable states, regardless of etiology, age, or severity of the condition" (Feuerstein, Klein, & Tannenbaum, 1991, p. 13). This theory brings hope to students and teachers alike as it signifies that even students with cognitive deficiencies have the potential to positively modify and develop their levels of cognition.

Embedded in this theory of SCM is the theory of MLE (Pou, Seng, & Tan, 2003). While the theory of SCM addresses how change at the cognitive level occurs, the theory of MLE is a theory of intervention which addresses how this change occurs in reality. MLE proposes that the key to enhancing the cognitive development of an individual lies in the mediation process whereby the mediator plays a vital role in ensuring that meaningful learning takes place between the individual and the environment (Pou, Seng, & Tan, 2003).

Cognitive Functions

As mentioned earlier, modifiability of cognitive functions is the core of Feuerstein's theory of Structural Cognitive Modifiability (SCM) and thus, Mediated Learning Experience (MLE) seeks to enhance these various cognitive functions via mediation. Hence, before the mediation can take place, the mediator has to be first cognizant of the cognitive functions that he/she desires to improve in the learner. It is only with the identification of relevant cognitive functions that the appropriate course of mediation could be planned in such a way that the interaction is intentionally directed towards achieving the desired cognitive functioning in learners (Seng & Tan, 2008).

Figure 2: Cognitive functions disc (Seng & Tan, 2008).

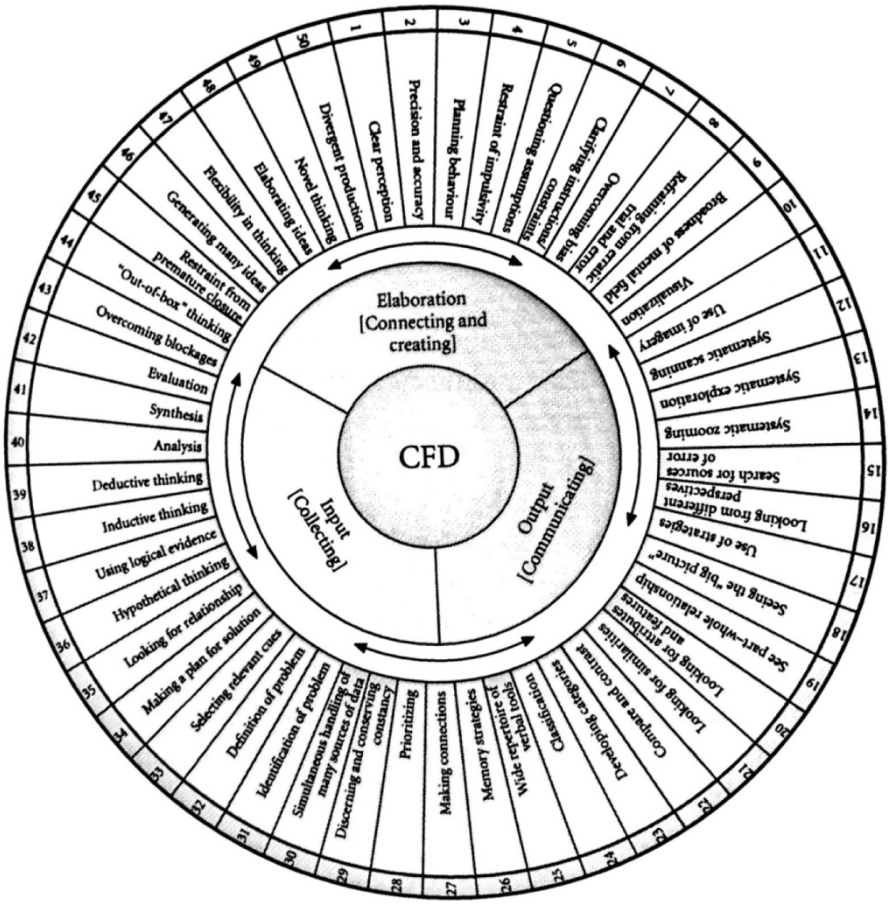


Figure 2 is a cognitive functions disc illustrating a list of possible cognitive functions that the mediator could seek to develop in the learner. Once the desired cognitive functions have been identified by the mediator, MLE could be carried out with the purpose of enhancing these cognitive functions in learners.

Parameters of Mediated Learning Experience

There are in total twelve parameters that characterize the mediation process, of which only three are necessary for the mediation process to take place: mediation of intentionality and reciprocity, mediation of meaning and mediation of transcendence. This research paper focuses on these three necessary parameters and a fourth parameter – mediation of competence.

Applying Principles of MLE into Geography Lessons

This research paper explores how the principles of MLE may be utilized to improve the inquiry-based learning approach through addressing the issues of (1) Lack of intentional mediation of cognitive functions, (2) Lack of continuous mediation and (3) Lack of emphasis on enhancing students' dispositions in learning.

Firstly, according to the theory of MLE, cognitive functions in learners could be

enhanced via quality mediation between the mediator and the learner. This quality mediation is dependent upon the mediator who plays a pivotal role in intentionally transforming the stimuli from the environment to allow for the development of cognitive functions (Chua, Tan, & Sock, 2017). Therefore, the interaction between the mediator and the learner essentially refers to the intentional mediation of cognitive functions. Moreover, a necessary parameter of mediated learning is the mediation of intentionality and reciprocity. This implies that the mediator has to be cognizant of his/her intentions to develop selected cognitive functions and thereafter to communicate these intentions to his/her students. Being aware of his/her intentions would help the teacher to clearly express them to the students, thus strengthening the intentionality of the mediation of cognitive functions (Tan, 2003), ensuring that the mediation does not happen by chance. As such, the incorporation of MLE principles in geography lessons would help to ensure that there is some extent of intentional mediation of cognitive functions in students.

Secondly, the parameter of intentionality and reciprocity indicates that mediation between the mediator and learner is one that is highly interactive in nature as it calls for the learner to respond to the mediator's intentions. In classrooms where didactic teaching is often carried out, there is an absence of reciprocity and students are passive recipients of content information (Chua, Tan, & Sock, 2017). Hence, if teachers were to conduct inquiry-based learning that is underpinned with principles of MLE, continuous mediation is likely to take place as they would be aware of having to mediate the parameter of intentionality and reciprocity. Through mediation of intentionality and reciprocity, students are more likely to be engaged which subsequently allows for continuous interaction to take place between the teacher and students.

Thirdly, mediation of meaning and competence aims at improving students' dispositions towards learning which addresses the last area of improvement identified in inquiry-based learning. Mediation of meaning has an emotional aspect which nurtures intrinsic motivation (Chua, Tan, & Sock, 2017) while mediation of competence builds up the learner's self-confidence and removes the fear of failure (Tan, 2003). Therefore, the mediation of both of these parameters is likely to result in students having more positive dispositions towards learning, thus addressing the lack of emphasis on enhancing students' dispositions in the inquiry-based learning approach.

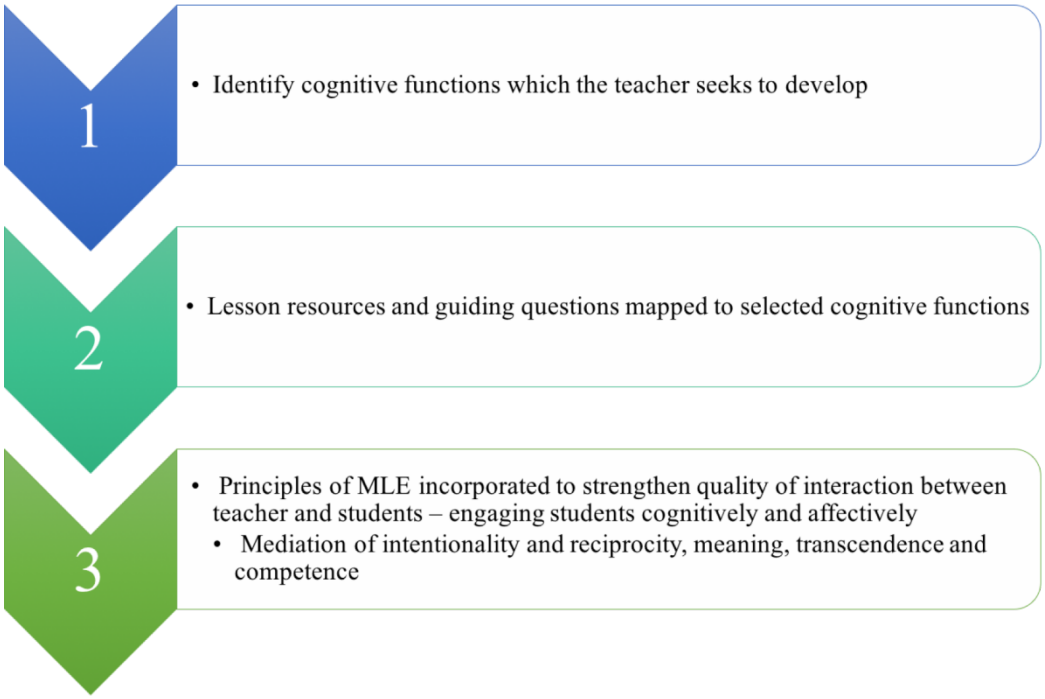
Given that MLE appears to be able to address the areas for improvement in inquiry-based learning, this research paper seeks to explore how the principles of MLE may underpin inquiry-based learning such that the development of cognitive functions could be further enhanced in geography lessons. It must be acknowledged that the existing inquiry-based learning approach had, albeit unknowingly, incorporated some elements of MLE. For instance, the inquiry-based learning approach is a question-driven one whereby the content syllabus is learnt through the asking of inquiry questions. The use of questioning to approach the learning of geography relates to the parameter of intentionality and reciprocity as it enables for some form of interaction to take place between the teacher and students as opposed to the traditional pedagogy of didactic teaching. However, while some elements of MLE are evident in the current inquiry-based learning, there is still room for the development of cognitive functions to be made more intentional through the inquiry approach.

Therefore, to achieve this, the principles of MLE would be employed to underpin the inquiry approach in geography lessons.

Overview

The following flowchart illustrates an overview of how the application of MLE may take place in geography lessons: :

Figure 3: A flowchart illustrating the overview of how MLE principles may be applied to geography lessons



Identifying Cognitive Functions

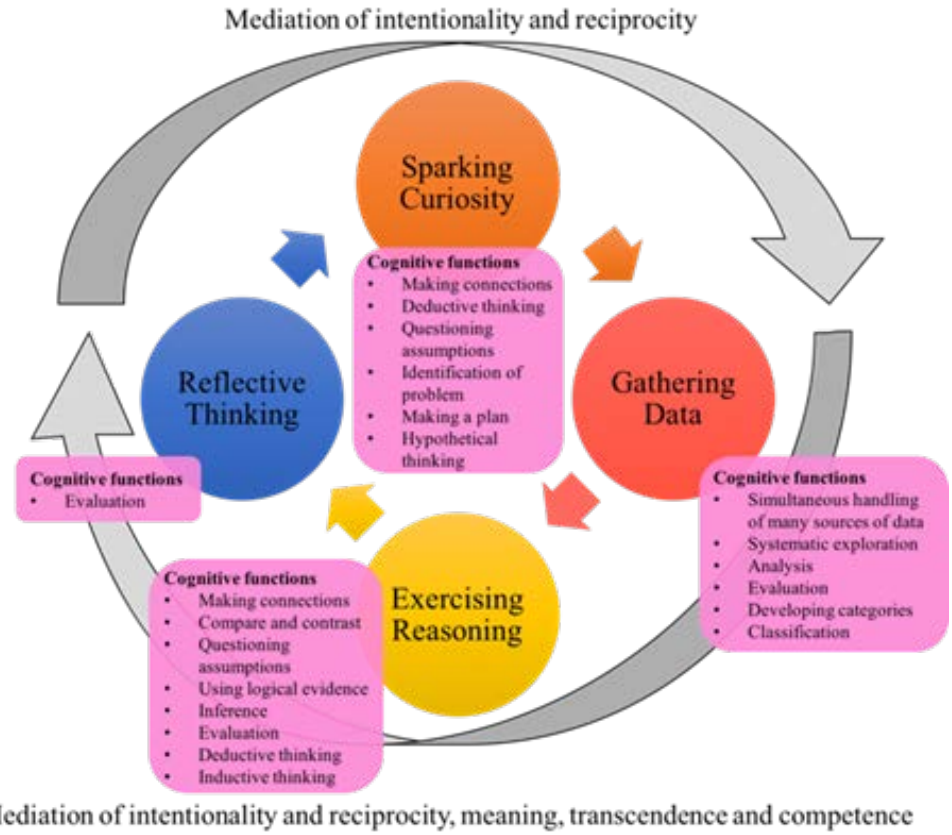
Firstly, for the development of cognitive functions to be made more intentional, the predominant cognitive processes that take place during each stage of the geographical inquiry cycle is mapped to its respective cognitive functions. Table 1 below shows the mapping of the predominant cognitive processes in each stage of the geographical inquiry cycle to its respective cognitive functions while Figure 4 summarises the different cognitive functions that appear in each of the four stages.

Table 1: Mapping of cognitive functions to the cognitive processes in the four stages of the geographical inquiry cycle.

Stages of geographical inquiry cycle	What takes place during this stage?	Cognitive functions present (based on cognitive functions disc)
Sparking curiosity Parameter of intentionality and reciprocity	Students partake in speculation: • Activating prior knowledge • Reasoning	• Making connections • Deductive thinking
	• Activating their prior knowledge	• Making connections
	• Challenge assumptions	• Questioning assumptions
	• Identify gaps in their understanding	• Identification of problem
	• Develop a plan to carry out investigation on the gaps of understanding OR • Formulate hypothesis	• Making a plan • Hypothetical thinking / making a plan for solution
Gathering data Parameters of intentionality and reciprocity, transcendence, competence and meaning	• Collecting data	• Simultaneous handling of many sources of data • Systematic exploration
	• Make decisions about selection of relevant and useful evidence	• Analysis • Evaluation
	• Classification and sequencing of information	• Developing categories • Classification
	• Data analysis and interpretation	• Analysis
Exercising reasoning Parameters of intentionality and reciprocity, transcendence, competence and meaning	• Testing hypothesis	• Deductive thinking
	• Observing and reaching conclusions from empirical data	• Inductive thinking
	• Understand and explain relationships between events, policies and procedures	• Making connections
	• Make connections with the new information found	• Making connections
	• Comparison of various sources of information	• Compare and contrast
	• Questioning assumptions	• Questioning assumptions
	• Giving reasons and using evidence to support	• Using logical evidence
	• Consider implications	• Inference
	• Determining reliability and usefulness	• Evaluation
	• Evaluating criteria	• Evaluation
Reflective thinking Parameters of intentionality and reciprocity, transcendence,	• Critically evaluate their process of inquiry	• Evaluation
	• Evaluate reliability of data	• Evaluation

Table 1 provides a general overview of the cognitive functions which typically occur in each stage. This table is not meant to represent an exhaustive list of all the possible cognitive functions but serves to outline some of the predominant ones that are found to be present at each stage. Depending on the lesson objectives set out by the teacher, there may be other cognitive functions which are not listed in Table 1 but could be identified by the teacher as important thinking skills that should be developed in students.

Figure 4: Summary of the cognitive functions in the four stages of the geographical inquiry cycle.



Mapping of Lesson Resources and Guiding Questions to Cognitive Functions

Mediated learning experience involves intervention taking place at two levels – design of lesson resources and the mediation process (Pou, Seng, & Tan, 2003). Thus, to allow for the intentional development of cognitive functions, both the lesson resources and the questions used during the mediation process should be mapped to the cognitive functions which the teacher seeks to enhance. In this way, the mapping ensures that every aspect of the lesson is purposeful in mediating the desired cognitive functions.

At the first level of intervention, the teacher prepares lesson resources that are directed at mediating the intended cognitive functions. Lesson resources refer to all the resources that the teacher would use to teach the geography lesson. This includes resources such as PowerPoint slides for teaching, handouts for students and stimulus material which may range from videos, texts to pictures. Therefore, once the cognitive functions have been identified, teachers may select and prepare the lesson resources such that they intentionally develop cognitive functions. For instance, if the teacher wishes to develop the cognitive function of evaluation, he/she may design a handout that provides students with the opportunity to assess the reliability of different

geographical information sources.

The interaction between the teacher and students constitutes the second level of intervention in MLE. During the mediation, teachers play the role of an active facilitator and are responsible for asking students questions with the aim of enhancing the desired cognitive functions. Table 3 (seen below) shows a mapping of cognitive functions to possible guiding questions, allowing the teacher to intentionally mediate cognitive functions through questioning.

Table 3: Possible questions relating to the respective cognitive functions which have been identified to be commonly present in the geographical inquiry cycle.

Cognitive Functions Identified in Geographical Inquiry Cycle	Possible Guiding Questions
Making connections	• How does this relate to what you have previously learnt?
Deductive thinking	• Knowing that the general principle is _____, what can you conclude about this specific case study?
Inductive thinking	• What is something in common found among these case studies? What can you conclude about _____ from these specific case studies?
Questioning assumptions	• What are some assumptions present in this source? • Do you agree with what this source is suggesting/assuming? Why or why not? • Are their suggestions/assumptions backed up with evidence? • How do you verify or disprove this assumption?
Identification of problem	• What is the gap in our understanding? • What do we need to find out more about? • What do we need to investigate on?
Making a plan	• What do we need to carry out our investigation? • How should we carry out our investigation?
Hypothetical thinking	• What do you think would happen if _____? • What do you think caused this to happen?
Simultaneous handling of many sources of data	• Have you looked through the other sources of data? • What do the other sources say about this particular issue?
Systematic exploration/ scanning	• Do you think you have missed out on any source of data? • Have you looked through all the possible sources of data?
Analysis	• What are some social, economical and environmental impacts that you can identify? • What are some reasons that could give rise to this phenomenon/trend?
Evaluation	• Is the data presented by the information sources reliable? • Do you think this is a good argument? Why or why not?
Developing categories/ classification	• What do these sources have in common? • What differentiates some sources from others? • Is there a way to group and organise these sources?
Compare and contrast	• What are some similarities you can pick out? • In what ways are the two sources similar?

Cognitive Functions Identified in Geographical Inquiry Cycle	Possible Guiding Questions
	• What are some differences you can pick out? • In what ways are the two sources different?
Using logical evidence	• What evidence do you have to support what you are saying? • Are the reasons cited in the sources true? How do we verify if it is true?
Inference	• What do you think the source is telling me? • What can you conclude from reading/watching/observing this source?

Incorporation of MLE Principles To Strengthen Mediation

To improve upon the quality of interaction between the teacher and students, MLE parameters may be employed to underpin the mediation process. Hence, this section aims to provide examples of how the mediation of different parameters would occur in reality, demonstrating how interaction between teacher and students could possibly look like when underpinned with MLE parameters.

Firstly, the parameter of intentionality and reciprocity is an important principle which teachers could incorporate in their classrooms to shift away from the current practice of didactic teaching to facilitating a classroom environment that is highly interactive. This parameter also helps to ensure that continuous mediation takes place as students are required to respond to the teacher rather than being passive receipients of information (Chua, Tan, & Sock, 2017). Chua (2003) provided some examples which would demonstrate the parameter of intentionality and reciprocity in classrooms:

- The teacher is clear about his/her teaching objectives and intentions and makes them explicit to the class. The development of certain cognitive functions could be an example of a teaching objective which the teacher wishes to accomplish by the end of the lesson.

- Reciprocity occurs not only when teacher's objectives and intentions are made clear to students, but also occurs when these teaching objectives become the students' own learning objectives. For this to happen, sparking curiosity is critical in getting students interested in learning and creating in them a need to know such that students become personally engaged in wanting to learn what the teacher has to teach.

- Teacher may foster a highly interactive learning environment through:

  - Asking probing questions rather than "what" questions.

  - Creating a classroom climate that is safe for students to ask questions. This includes listening attentively to students' questions and encouraging them after they have responded to questions, regardless of their answers.

Secondly, the affective domains of learning are engaged when the teacher

mediates the parameter of meaning as it aids in fostering intrinsic motivation to learn. The following are some conditions provided by Chua (2003) which could be implemented by teachers in classrooms to mediate meaning with students:

- Explaining the significance and importance of the topic to students.
- Relating the topic to students such that it becomes relevant to them.
- Teaching the subject topic with enthusiasm and passion which mediates meaning to students on an emotional level.
- Aiding students to apply their knowledge to other subjects

Thirdly, mediation of transcendence refers to students developing strategies to solve issues beyond the current problem and making connections between things in the world. This enables students to gain a richer understanding of the world and cultivates a curiosity to know more about things and how they are interconnected (Skuy et al., 1996). According to Chua (2003), the teacher may possibly bring about transcendence in the classroom by:

- Making connections between the current issue and students' prior knowledge.
- Enlarging the worldview of students beyond the current issue and helping them see the current issue in light of the "bigger picture".
- Facilitating students' understanding of how knowledge/learning of the current issue could be applied to other situations/subjects.

The last parameter is mediation of competence which is not a necessary parameter but is particularly useful in engaging students affectively and positively influencing their dispositions towards learning. Seng (1997) suggested the following ways in which teacher may seek to foster feelings of competence in classrooms:

- Inculcating in students a positive belief in their capabilities.
- Encouraging students when they have been observed to have tried and persevered in their learning.
- Having realistically high expectations of students which convey the teacher's confidence in the abilities of students.
- Planning assignments that have difficulty levels which fall within the level of expertise of students such that success could be reasonably attained by them.
- Rewarding students with praise when they have achieved success in various aspects of their work.

Conclusion

The current inquiry-based learning approach is indeed a laudable attempt to shift away from didactic teaching to greater engagement and involvement of students in their learning process. However, as this research paper has highlighted, there could be more intentional mediation of the development of cognitive functions and more emphasis placed on the affective dimensions of learning. Therefore, MLE was brought in to address the areas of improvement identified in the current pedagogical approach. This research paper thus puts forth a broad conceptualization of how MLE principles could underpin the

inquiry-based learning approach in geography lessons. A specific lesson plan and its accompanying resources have also been provided in appendices B–E to illustrate how a geography lesson infused with MLE principles might be implemented in reality, thus concretizing the proposed broad conceptualization.

With its theoretical underpinnings of MLE, this paper offers a different lens to view the teaching of geography. This new lens now looks upon the role of the teacher as an active facilitator whereby the development of cognitive functions occurs due to teacher's intentional facilitation of stimuli in the learning environment. Additionally, the intentional nature of the mediation process inevitably implies that every aspect of the lesson is used and facilitated by the teacher to bring about the development of cognitive functions. Hence, this implies that the design of the lesson (activities and resources) and the mediation process (interaction between teacher and students) have to be deliberately planned for the desired cognitive functions to be enhanced in students.

Although MLE has been gaining traction in Singapore, there have been very few studies to date detailing how MLE may be applied and used during geography lessons. Therefore, this conceptualization is still in its beginning stages and moving forward, empirical studies could be conducted to ascertain if MLE is indeed able to value add to the teaching of geography in the classroom setting. Subsequently, empirical studies which have been carried out could be useful to inform and improve the initial conceptualization that has been proposed by this research paper.

This research was undertaken as an Undergraduate Research on Campus project at NTU. Supervised by Dr. Chua Bee Leng

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