

# ‘Becoming Experts’: Learning through Mediation

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## ABSTRACT

**Purpose** – This study is largely founded on Vygotsky’s sociocultural theory, Feuerstein’s theory of Mediated Learning Experience and Lave and Wenger’s ‘community of practice’, which concerned building a community of learners that places mediation as central in learning and teaching. While the overall study involved Malaysian Year One English and Mathematics classrooms, this article focuses only on the latter. Two research questions were posed: 1) How does the teacher/peers mediate learning? 2) How does mediation influence the individual’s identity?

**Method** – This qualitative study was conducted within a period of three months. Data collection included intense classroom observations, interviews, classroom discourse and dialogic discussions with teachers and pupils. Microgenetic analyses of transcripts were made to show moment-to moment changes observed.

**Findings** – Four types of mediation emerged from the data: Environmental mediation, cognitive mediation, affective mediation and metacognitive mediation (i.e., an ECAM model for mediation). Findings suggest that mediation enabled the Mathematics teacher to change, to take ownership and to sustain her new pedagogical approaches within the classroom. This re-focusing benefited her pupils, and dramatically changed a particular less able pupil from one who was initially ‘lost in his world,’ into one who was able to engage in the learning process, take ownership of his own learning, as well as mediate other pupils’ learning.

**Value** – Hence it is argued that the ECAM model for mediation provided opportunities for this teacher and her pupil to expand their capacity to learn and develop their identities as individuals capable of learning and becoming ‘experts’.

**Keywords:** Learning through mediation, Sociocultural theory, Community of practice, Primary school

## INTRODUCTION

### *Defining Mediation*

Two theories that have focussed on a mediational approach to learning are the Vygotskian socio-cultural theory (SCT) (Vygotsky, 1978, 1981) and Feuerstein’s theory of Mediated Learning Experience (MLE) (Feuerstein & Feuerstein, 1991; Feuerstein, Rand, & Rynders, 1988; Lidz, 1991, 2002). The central concept of both SCT and MLE is mediation, and both approaches explore the nature of socio-cultural forces in shaping the learner’s development and learning (Kozulin, 2002). Through mediation, learners subsequently develop their identity from being legitimate peripheral members to being core members (Wenger, 1998; Hodkinson & Hodkinson, 2004), from being a novice to taking ownership in the learning and becoming an expert.

The notion that at the heart of SCT and MLE is the concept of mediation in which learners develop with the help of others seems straightforward enough. Nonetheless, mediation is a complex concept and has been generally defined in terms of element and process. The main *elements* in mediation are human and symbolic mediators. Hence, mediation has been defined as human or symbolic intermediaries placed between learners and the object to be learned, enabling them to achieve higher mental functions so that they will be able to later transform their learning (Kozulin, 2002; Kozulin & Garb, 2002). Mediation has also been defined as a *process* in which learners develop their mental processes or habits of mind during collaboratively constructed dialogic activity, through “symbolic and socioculturally constructed artefacts, the most pervasive of which is language” (Aljaafreh & Lantolf, 1994, p. 467). In the school setting, this dialogic activity happens between teachers and pupils. The process usually, but not necessarily (McCafferty & Ahmed, 2000), involves the use of a sign system (Vygotsky, 1986), for example,

language, in activities that require pupils to engage in a dialogue and to work together with their teachers or their peers so that through this process they are able to develop higher mental functions. However it is a complex process, involving distinct human characteristics such as emotions and ways of thinking that affect the way learners engage in the process and in their learning environment.

In this study, mediation refers to the interventions, i.e., teaching provided by the mediator to enrich the learning processes through greater engagement with the learners, (who in this study include both pupils and teachers). Mediation is a combination of creating a supportive learning environment that challenges the learners, yet facilitates their learning. Just as there are different learning styles, there are different types of mediation that mediators, i.e., teacher educators, teachers, and adult or pupil peers, need to consider to meet the different needs of individuals.

### ***Types of Mediation***

Karpov and Haywood (1998) established two types of mediation that owe their origin to SCT: *metacognitive mediation* and *cognitive mediation*. Metacognitive mediation refers to children's acquisition of semiotic tools of self-regulation: self-planning, self-monitoring, self checking and self-evaluating. Cognitive mediation, on the other hand, refers to children's acquisition of cognitive tools that are necessary for solving subject-domain problems, or in Vygotsky's term, 'scientific concepts', for example, learning to read or learning to count.

Although Vygotsky refers to tools as primarily psychological and symbolic, proponents of the Neo-Vygotskian movement have also considered the physical and the environment as tools to mediate learning. These would include, for example, the use of apparatus that support the understanding of complex concepts in science, or computer software in ICT (Davis & Miyake, 2004; Puntambekar & Hubscher, 2005; Wertsch, 1991; Wertsch, Minick, & Arns, 1984), or the layout of the learning environment, such as arrangements of tables and chairs (McGonigal, 1999). In addition to the physical and the environmental aspects, Mahn and John-Steiner (2002), based on Vygotsky's concept of '*perezhivanie*', argue that the mediator needs to be sensitive towards the learner's perception, reaction and experience of the emotional aspect of social interaction. This idea suggests that teachers need to be aware of ways to stimulate their pupils' feelings and thinking so that they can engage in their learning

(Dai & Sternberg, 2004) and feel motivated to complete the activity given. When learners are able to complete the activity, they will be enabled to take control of their learning, which will build their confidence (Mahn & John-Steiner, 2002), increase their self efficacy and strengthen their identity as someone capable of accomplishing the activity.

### ***Providing Mediation in the Learning Context***

In school, the role of the teacher and teaching pedagogy also affect the use of mediation (Williams & Burden, 1997). Recent empirical findings have demonstrated that teachers can have an impact on the quality of pupils' discussions in small-groups, and that the nature of the role assumed by the teacher is crucial for the promotion of successful learning and productive discussion (Meloth & Deering, 1999; Mercer & Wegerif, 1999; Rasku-Puttonen, Etelapelto, Hakkinen, & Arvaja, 2002; Blatchford, Kutnick, Baines & Galton, 2003). Teachers who provide opportunities for their learners to participate in joint activities in the classroom by increasing the amount of interaction either with the teacher or peers (another possible human mediator), enable the learners to increase control over their own process of learning and internalisation (Anton, 1999; Ash & Levitt, 2003; Gibbons, 2003; Nussbaum, Alvarez, McFarlane, Gomez, Claro & Radovic, 2009). However, Edwards and D'Arcy (2004) claim that more often than not, the learning process is seen to be less important than the outcome.

Scaffolding or learning support is fundamental to mediation, and is generally acknowledged as a necessary part of the learning process, even though it clearly relates to raising the level of learning outcomes (Wood, 1988; Bonk & Graham, 2006). Yet, for many reasons *scaffolding* does not seem to be a central consideration in the teaching and learning environment. Instead, it appears that teachers face greater organizational issues like class size, classroom control and management, teacher workload, prescribed curriculum, meeting standards and achievement targets set by the school and external issue like managing learners' various levels of abilities (Edwards & D'Arcy, 2004). Thus, to construct a learning community where mediation is central, we need to raise teachers' awareness about mediation through modelling the scaffolding of pupils' learning in the classroom.

A learning community, in this study, refers to a group of people (which includes the researcher, teachers and pupils), working together with a desired goal, that is to enhance learning in

an environment that fosters collaboration, emotional and cognitive support, personal growth and synergy of effort. Such a learning community engages in interaction for the purpose of learning through negotiation, collaboration and co-construction of knowledge out of the language and cultural artefacts available in the community.

### *Mediation in Relation to the Community of Practice*

One concept that extends the notion of community and is prominently used in many areas, especially in education, is the notion of community of practice (CoP), which emphasises socially situated learning in SCT (Lave & Wenger, 1991). Lave and Wenger (1991, p.53) view learning as involving the “whole person; it implies not only a relation to specific activities, but a relation to social communities – it implies becoming a full participant, a member.” Through observation, participation and exposure to varied experiences in supported routines and challenging activities, the learners become skilled practitioners, i.e., core members, in solving problems in their communities (Lave & Wenger, 1991). Consequently by working with others, pupils may adopt or imitate others’ ways of working in a CoP through interactions (Lave & Wenger, 1991; Wegner, 2004; Wenger, 1998). Over time, these members begin to take on an increasing responsibility for their own learning and participation. This provides further opportunities for learners to synthesise several influences on their own personal understanding. In this regard, participation of members, i.e., teachers and pupils, is crucial in investigating development (Palmer, Stough, & Gonzales, 2005).

Wenger describes ‘participations’ as active involvement in a CoP (Wegner, 2004; Wenger, 1998) based on the recognition of a “mutual ability to negotiate meaning” (Wenger, 1998, p.58). This is in line with Vygotsky’s view of learners being active participants in learning with others. Hence, taking this framework of learning further suggests that teachers and pupils, as ‘learners/members/participants’ of the learning community, share common characteristics. These characteristics are: diversity of expertise, a shared objective of continually advancing the collective knowledge and skills, an emphasis on learning how to learn and finally, mechanisms for sharing what is learned (Bielaczyc & Collins, 1999).

Participating and interacting in collaboration also give prospect to the development of one's identity. In terms of identity, collaboration transforms individuals from:

...marginal members of a community to contributing participants in expanding circles of community of practices that they reciprocally help to forge. Thus collaboration and the mutuality of learning it brings about, is the *reason* for and the *result* of goal-directed, mediated social relations.

(Donato, 2004, p. 289)

In this view, and according to Wenger (1998), the transformation of roles, which is pertinent to future participation in educational practices, suggests a change in identity from being a novice to becoming an 'expert'.

## STUDY FOCUS

The study reported here focuses on the importance of learning through mediation in enhancing an individual's capacity to learn. It argues that enhancing one's capacity to learn can be achieved by providing a model for mediation that considers the environmental, cognitive, affective and metacognitive aspects of learning and by promoting the idea of collaboration. The larger study (Fauziah, 2007) involved an intervention designed to build a community of learners involving two teachers (i.e. an English teacher and a Mathematics teacher) and a group of seven-year-old pupils, that placed mediation as central in the learning and teaching of English and Mathematics in a second language context.

### *Research Questions*

Two research questions were posed:

- 1) How does the teacher/peers mediate learning? (i.e., what are the types of mediation employed?)
- 2) How does mediation influence the individual's identity?

To provide evidence in relation to these questions, we will share selected findings based on the data from the Mathematics teacher and a student from the less able group.

## METHODOLOGY

Data in this qualitative study were gathered by the first author (henceforth referred to as the researcher) from a Year One class in a primary school located in a sub-urban area of Selangor, Malaysia. The class consisted of 19 girls and 14 boys. Coincidentally, the teacher and the pupils were Malay, which is the major ethnic group in Malaysia. Data gathering was undertaken within a period of three months, between January and March as schools commenced in January. Verbal consent was obtained from the teacher and pupils involved before data collection began. It was explained to the participants that they could choose not to be involved, and could opt out at any time during the data collection period. The class teacher, as required by the school administration, obtained consent from parents for the pupils' participation during the first week of school. To ensure confidentiality and anonymity, all the participants were provided with pseudonyms.

### *Phases of the Study*

This study was divided into three phases: 1) *the actual phase*, which involved observing the existing teaching practices; 2) *the mediational phase*, which included the intervention provided for the teachers to understand how to mediate their pupils' learning, and for the pupils to experience learning through mediation; and 3) *the potential phase* which consisted of observations of changes in teachers' approaches to teaching and changes in pupils' learning.

The researcher's role as an observer changed in the three phases from a non-participant observer in the actual phase, to a participant observer in the mediational phase, and reverted to the non-participant observer in the potential phase. The range of methods included interviewing, modelling, observing, and discussing; field notes, audio and some video recordings were used when conducting intense classroom observations, classroom discourse and dialogic discussions.

### *Observations*

Observations during whole class interaction were made by noting down the activity involved, every ten minutes, with five minutes intervals, using an observation schedule. The observations included what the teacher was doing and what the pupils were doing, especially

in the group observed. Questions or ideas about what was observed were also noted down and later used during discussions with the teacher. Observations for the group interaction, depending on the group being observed, involved noting down the pupils' behaviours when completing the task given. In total 16 Mathematics lessons were observed.

### ***Interviews***

The teacher was also interviewed several times throughout the study. The first interview in the actual phase provided information to generate a profile of the teacher. Questions were asked pertaining to her background and teaching qualification, her perceptions of the reforms in the education in relation to the use of English Language to teach Mathematics, how pupils learn, her teaching approaches and her perceptions of an ideal lesson. Two interviews were conducted in the mediational phase. The first was to find out the reasons for the teacher's resistance to change or difficulties involved when mediation was provided; the second was to ascertain her understanding of what she needed to do. The final interview conducted in the potential phase was to ascertain the difficulties, intentions and possibilities of implementing the new approach in her lessons.

### ***Profile of the Participants***

The two main participants discussed will be known as Miss Dee, the mathematics and class teacher of the class involved, and Jaya, a male student from one of the groups. At the time of data collection, Miss Dee had been a teacher in the school for two and a half years. She had received her teacher development certificate majoring in Mathematics from a teacher training college located southern Malaysia. Her training in Mathematics was conducted in *Bahasa Melayu*, which is her first language (L1) and the official language of Malaysia. However, by the time she was posted to the school, she, like all the Mathematics and Science teachers, was involved in a major curriculum change, i.e. the use of English as a medium of instruction for Science and Mathematics. She had attended many in-service courses, which had given her exposure to the language needed to assist her in the lessons.

Based on Miss Dee's assessment, Jaya, a male pupil from the less able group (WG), scored poorly in his ability to read both in Bahasa Melayu and English. Although he knew most of the letters

of the alphabet by heart, he was muddled as he reached the letters 'l', 'm', 'n', 'p' and 'q'. As for his knowledge of numbers from 0 to 10, he could confidently and consistently recognize the numbers 1 to 6 and 10 in English on his own, but had problems recognising aurally the numbers 7, 8 and 9. However, he was able to recite the numbers 0 to 10 in Bahasa Melayu confidently. Jaya appeared to be constantly in a daze. Whatever instruction the teachers gave, he did something else or appeared not to be interested in what he needed to do. Often, he became confused as a result of this; hence he always sought the assistance of others. Jaya often needed one-to-one explanation, which was provided by the teacher (or the researcher during the mediational stage) in order to check if he was doing the right thing. Usually, he was one of the last pupils to react to what needed to be done in his group during group work activities in the beginning of the mediational phase.

### *Data Analysis*

The interviews and classroom interactions were transcribed in full. Microgenetic analyses of transcripts were completed. This analysis involved close scrutiny of transcripts from the classroom interactions, interviews and dialogic discussions to identify moment-to-moment changes of the teacher and pupils in relation to mediated learning. Consequently, the criteria for development were described in terms of changes in the learner's (i.e., teacher's or pupil's) performance. Changes in the learners' performance included their control over completing a task. For example, for pupils: in solving a problem or their active role in participating in collaborative work and their ability to show they are in control and can work independently on something that they initially needed help to do; for teachers: in planning a lesson that challenged pupils' learning; for both: expressing themselves in the target language.

In the following discussion of the study findings, the original file numbers (e.g., ML24F) have been retained to differentiate between lessons. Italicised phrases indicate the participants' use of their first language.

## **FINDINGS**

In the actual phase, it was observed that Miss Dee's pedagogic approach was didactic and highly controlled whereby she took a dominating role during interactions in her lessons. A typical

questioning technique used by Miss Dee could be classified in the form of IRF (Sinclair & Coulthard, 1975), i.e. teacher initiating a response (I) and pupils providing the response (R) followed by teacher's feedback (F). These reiteration of closed question functioned as a form of repetition and drills for practice, as illustrated in the following extract:

ML4J05

The topic was writing numbers. Miss Dee made pupils repeat the actions several times.

45 Miss Dee Now after number three?

46 Ps Four

47 Miss Dee Number four how to write number four? ... (Miss Dee writes number four) ok again follow me (Miss Dee and pupils write number four in the air using their fingers) ok again start from here again (..) (pupils repeated the action) again (..) (some pupils making the noise again as they make each stroke to make number four) OK OK like this (Miss Dee writes number four on the whiteboard) this is number?

48 Ps Four

During this time, the pupils were involved in whole class interaction. This was followed by an individual worksheet task. Due to the traditional seating positions where pupils sat in rows and in twos, pupils like Jaya, who needed help, tended to position themselves by sitting at the far sides of the rows or at the back of the class so that they remained unnoticed. As a result, Jaya became oblivious of what he needed to do and often seemed to be in a daze during individual work.

During the mediational phase, discussions were conducted with Miss Dee about the possibilities of changing the seating positions of the pupils into groups, and providing group work and challenging tasks for the pupils. This was the researcher's attempt to collaborate with Miss Dee in preparing the lessons, whilst providing mediation to help her understand the need to mediate her pupils' learning. However, the idea of challenging pupils and creating group activities was overwhelming for Miss Dee who, as a class teacher, was struggling to find time to prepare her lessons, and more so when she was doing something in which she lacked confidence.

Hence, the researcher opted to model possible teaching approaches in the initial stage of the phase while Miss Dee observed and gave comments. This modelling then provided a topic for discussion with Miss Dee on how to facilitate pupils' learning and how to understand the challenges of providing mediation to 33 pupils, who by then were divided into five groups of different abilities. Since Miss Dee and the researcher each taught some lessons, the issues could be discussed on a level playing field.

Jaya was a member of the WG group, which consisted of five other pupils: Yusof, Sheila, Lisa, Anie and Mat. During the mediational phase, the pupils were encouraged to work in groups, which simultaneously provided opportunities for pupils to interact with one another. Like the other two of his group mates, Jaya tended to observe Sheila and Yusof taking the lead during group work in the beginning of the mediational phase.

### *Evidence of Mediation*

Four types of mediation emerged from the data - environmental, cognitive, affective and metacognitive. The following sections will provide evidence of each type of mediation.

#### *1) Environmental Mediation*

In one lesson on counting numbers between 0 and 10, Miss Dee gave pupils in WG a chart, which showed words and numbers from one to twenty, with pictures associating quantity with number. Each time Miss Dee asked the group to count to 10, Sheila used the chart to count to 20. Intrigued by Sheila's ability to do this, Jaya used the number chart to ask Sheila to read the numbers to him. Jaya and Sheila's behaviour demonstrated that learning tools might be used in ways that are different from what the teacher had planned. Jaya's use of the chart and Sheila's contribution of chanting the numbers from 0 to 20 became a form of incidental scaffolding provided between peers, which enabled Jaya to become interested in his own learning. The use of the chart, in this case, provided environmental mediation to motivate Jaya to learn his numbers even beyond what Miss Dee originally intended.

As a result of such instances, Miss Dee began to use various learning tools when teaching other mathematical concepts. As shown in the following fieldnotes and transcript, beads, string, balls and boxes were utilized in teaching addition.

Fieldnotes: ML21F

Miss Dee used beads and strings to help the pupils learn to count and add.

ML21F

Miss Dee also used balls and boxes in one of the activities when teaching the concept of addition.

8 Miss Dee OK listen put five balls in box A

Providing environmental mediation through selecting certain resources such as number lines, abacus, sticks, beads, fingers and cards helped Miss Dee's pupils to understand abstract concepts, for example counting, as something more concrete. At the same time the pupils were also given the opportunity to practise the task with her before attempting them on their own or in their groups. These opportunities were essential for learners like Jaya, Mat, Anie and Lisa, who were still struggling with the concept of numbers, sequence and addition. Miss Dee also created another form of environmental mediation by structuring the lesson so that the pupils practised saying the numbers 0 to 10 while completing the activity in the group, i.e., stringing the beads or using number lines. This kind of activity provided scaffolding for pupils like Jaya to practise learning the numbers.

The evidence shows that by creating and organizing an environment for learning with the use of resources and tools, and the selection of task-types, Miss Dee had provided an environment that scaffolded her pupils' learning at a stage before actual interactions with pupils. Although this form of scaffolding has not always been explicitly acknowledged in research, with the exception of McGonigal (1999), it clearly stands separated from cognitive mediation in that it concerns setting up a basis to use cognitive approaches.

## 2) *Cognitive Mediation*

It was evident that having experienced the process of mediation in the mediational phase, Miss Dee showed positive qualitative change in her teaching through modelling (see ML21F) and questioning (see ML23F; ML4M). The use of questions that asked pupils to find clues and ways to solve problems raised the pupils' level of consciousness of this kind of activity.

ML21F [modelling]

The lesson was about addition for numbers between 0-9.

60 Miss Dee So you put together (using her fingers; 2 from the left and 5 from the right hand) and count (Miss Dee counts with Pupils) ok or you can put the bigger number in your head *put the bigger number in your head* (.) what is the number class? What is the bigger number class?

ML23F [questioning]

Miss Dee provided word problems for pupils to solve and asked how they solved the problems.

44 Miss Dee Ok what did you do? How did you get the answer?

ML4M [questioning]

Pupils in groups constructed a mathematical word problem and exchanged with other groups to solve each problem. Miss Dee facilitates each group.

40 Miss Dee Adie what is the clue?

In the potential phase, Jaya was transformed from a pupil who had been 'lost in his world' in the actual phase and in the initial stage of the mediational phase, to one who had become much more engaged and responsible in his group. He started contributing to his group during problem solving when he counted with Sheila to solve the mathematical problems, as shown in the following extract. (The notes provided in the right column indicate techniques used by Miss Dee when mediating Jaya's concept of addition.)

ML4M

Miss Dee facilitated Jaya's group in solving a mathematical word problem. Jaya was helping his group members to solve one of the questions.

68 Jaya (Counting with his seven fingers) 9,10,11,12,13,14,15 Checking to see if it is correct and using a strategy to count on

70 Miss Dee How did you get the answer [...] (no response from Jaya) *How did you get that answer?* Miss Dee repeated the question in L1 [CM- contingent responsivity]

71	Jaya	<u>put eight in my head and add on the seven</u>	Jaya explaining his strategy [CM – providing explanation] *note CM- cognitive mediation
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Miss Dee provided the question in *Bahasa Melayu* as a form of contingent responsivity (Lidz, 2002) to enable Jaya to explain his strategy. She realised that at this point, Jaya might not be able to articulate his strategy in English but would be able to do so if he were to explain in *Bahasa Melayu*. As stated by Lantolf (2000) mediation through the first language or L1 serves as a means of scaffolding future learning of L2 (Anton & DiCamilla, 1998). Consequently, Miss Dee provided an opportunity for Jaya to explain how he arrived at the answer. This not only enabled him to reflect on his thinking processes in solving the problem but also provided him with the confidence to extend his capacity to learn and develop a new identity as one who is capable of solving mathematical problems.

### 3) *Affective Mediation*

As Miss Dee began to challenge her pupils' learning, she, too, recognised the need to encourage the pupils to become engaged in the lesson. In the following two examples, Miss Dee provided emotive feedback that not only praised the pupils' efforts but also created opportunities for them to share their problem solving strategies with their peers, hence recognising her pupils' potential and empowering them to learn.

ML21F

The lesson was on adding numbers between 0-10

62 Miss Dee Good put five in your head

ML4M

Miss Dee went through the solutions by asking pupils to demonstrate how they solved the problem.

46 Miss Dee Very good Yusof show it to the class *show it to your friends how you solved the problem*

72 Miss Dee Very good Jaya (patting the pupil's back )

Enabling the pupils to share their strategies with their peers shifted Miss Dee's dominance of knowledge that existed in the actual phase to one that enabled pupils to share their 'expertise' in solving the problems, not only in the smaller group but with the whole class.

Jaya also showed that he was gaining confidence in his own learning and was willing to help his group mates, Lisa and Anie, during the abacus lesson as he checked and modelled the finger movement with the beads. This is shown in the following fieldnotes.

Fieldnotes: ML24F (abacus lesson)

Jaya was very good at following Miss Dee's instruction but Lisa and Anie had problems holding the pencil correctly and moving the beads using the correct finger. Jaya realised that they were struggling and gestured with his thumb to move up the bead. Anie observed Jaya who signalled to her to use her thumb. Lisa looked at Anie and also at Jaya. After a few rounds, both girls remembered to use the thumb to move up the bead. Jaya smiled and nodded to them.

Jaya gained control over his understanding of the mechanics of using the abacus, which now functioned as an alternative tool for him to use to solve future mathematical problems. In addition, he was also observed mediating his peer's understanding of the correct movement of the bead, which was part of the lesson objective. Hence, he was also sensitive to the needs of peers who were yet to gain control themselves. Smiling and nodding were Jaya's gestures of approval and praise to provide affective mediation to his group members. This form of mediation increased confidence in Jaya and heightened his self-efficacy (Bandura, 1989). Subsequently, Jaya moved from being a legitimate peripheral member to one who was more active in participation within his group (Wenger, 1998), developing a new identity of one who was more confident of offering mediation to peers in his group.

#### 4) *Metacognitive Mediation*

Miss Dee used questions designed to make the pupils aware of their thinking, thus providing metacognitive mediation to help them learn the different ways to solve mathematical problems, and to become aware of how to self regulate themselves and others. The following extracts illustrate how metacognitive mediation was provided.

#### ML24F

The lesson was on the introduction of addition of two numbers between 0-9.

- 43 Miss Dee come and show how you got the answer  
Zain (Zain demonstrated how to solve the problem) (..) OK class what did he do? Zain put together the beads so 3 beads in box A and 4 beads in box B make? How many, class?

#### ML2MC

Miss Dee presented a mathematical word problem for the whole class to solve and asked pupils how to solve the problem.

- 43 Miss Dee What to do class?

#### ML8MC

The lesson was on addition and pupils were given word problems that they need to solve.

- 69 Miss Dee So what should you say?

Questions such as the above can be found in the mediational and potential phase but not in the actual phase, where she mainly employed closed questions to check on the pupils' understanding, for example 'this is number?[pointing to number seven]'. Inviting pupils to demonstrate how problems were solved and asking questions that increased their awareness of the strategies involved encouraged pupils to model and regulate their peers' learning.

Jaya, in one of the group activities also monitored his group's progress in completing a given task, as shown here.

#### Fieldnotes: ML7MC

Miss Dee asked each group to come up with a word problem on addition based on the structure pinned on the board. Each group had to decide the object and numbers needed to complete the word problem. Then the groups were asked to exchange their questions so that they would have five different questions to solve in each group.

- 56 Jaya We've done question 3 and 5 (..) our group did number 1 right?  
57 Sheila yeah  
58 Jaya So we need to find two more 2 and 4, I'll go and get question 2.

Instead of observing others perform the task like he used to, Jaya had begun to show accountability to his group by actively participating in the given task and monitoring the progress that they needed to make in order to complete it.

## CONCLUSIONS

This study has delineated a model for facilitating learning which teachers and pupils can use to provide mediation to promote higher mental functions. The model consists of environmental, cognitive, affective and metacognitive types of mediation – the ECAM model of mediation. The central claims of the study are firstly, that a range of types of mediation is needed during collaboration and interaction to provide maximum opportunity for both teachers and pupils to develop, and secondly, that a way of describing this range of provision is via the ECAM model.

Evidence was provided to support the notion of the individual moving from the identity of a legitimate peripheral member to core member in his or her process of ‘cognitive apprenticeship’ (Lave & Wenger, 1991; Rogoff, 1990). This was exemplified by Jaya and Miss Dee moving from being novice to gaining control and becoming an expert. The findings suggest that the mediation provided to Miss Dee, the Mathematics teacher, enabled her to change, take ownership and sustain her new pedagogical approaches within the classroom. Miss Dee moved from being unsure of how to provide mediation to being confident of doing so. The change was equally challenging for her and her pupils. In amending her pedagogy, she became aware of the hard work that was involved in thinking and preparing for the lessons and activities. As Miss Dee began to gain control of what she needed to do and observed further pupil development as a result of the change in her pedagogy, she took ownership of her own learning by creating further opportunities for her pupils to expand their capacity to learn.

This change benefited her pupils, especially Jaya. Jaya’s identity was transformed from being a passive group member to one who was engaged in the learning process, able to take ownership of his own learning as well as willing to mediate his peers’ learning. Jaya strongly exemplifies how pupils are enabled to achieve higher mental functions through mediation and in interaction with their environment. This transformation was also evident when he demonstrated to Miss Dee that he was able to take control of

his learning by explaining the strategies he used in solving the mathematical problems. The change in his identity, from someone who was unsure to someone who was capable of solving problems, also built his confidence in taking ownership of his own learning.

We argue that ECAM model of mediation provided opportunities for this teacher and her pupil to expand their capacity to learn and develop their identities as individuals capable of learning and becoming 'experts'.

## REFERENCES

- Aljaafreh, A., & Lantolf, J. P. (1994). Negative feedback as regulation and second language learning in the zone of proximal development. *The Modern Language Journal*, 78(4), 465-483.
- Anton, M. (1999). The discourse of a learner-centered classroom: Sociocultural perspectives on teacher-learner interaction in the second-language classroom. *The Modern Language Journal*, 83(iii), 303-318.
- Anton, M., & DiCamilla, F. J. (1998). Socio-cognitive functions of L1 collaborative interaction in the L2 classroom. *The Canadian Modern Language Review*, 54, 314-342.
- Ash, D., & Levitt, K. (2003). Working within the zone of proximal development: Formative assessment as professional development. *Journal of Science Teacher Education*, 14(1), 23-48.
- Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Annals of child development: Six theories of child development* (Vol. 6, pp. 1-60). Greenwich, CT: JAI Press.
- Blatchford, P., Kutnick, P., Baines, E. & Galton, M. (2003). Toward a social pedagogy of classroom group work. *International Journal of Educational Research*, 39, 153-172.
- Bielaczyc, K., & Collins, A. (1999). Learning communities in classrooms: A reconceptualization of educational practice. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (pp. 269-292). Mahwah NJ: Erlbaum.
- Bonk, C.J. & Graham, C.R. (2006). *The handbook of global learning: Global perspectives, local designs*. Pfeiffer: Wiley.

- Dai, D.Y., & Sternberg, R. J. (2004). *Motivation, emotion and cognition: Integrative perspectives on intellectual functioning and development*. Mahwah, NJ: Erlbaum.
- Davis, E. A., & Miyake, N. (2004). Exploration of scaffolding in complex systems. *The Journal of the Learning Sciences*, 13(3), 265-272.
- Donato, R. (2004). Aspects of collaboration in pedagogical discourse. *Annual Review of Applied Linguistics*, 24, 284-302.
- Edwards, A., & D'Arcy, C. (2004). Relational agency and disposition in sociocultural accounts of learning to teach. *Educational Review*, 56(2), 147-155.
- Fauziah Abdul Rahim (2007). *Expanding the capacity to learn through the ECAM model of mediation: Teaching and learning English and Mathematics as a second language in a Malaysian primary school* (Unpublished doctoral dissertation). University of Nottingham, UK.
- Feuerstein, R., & Feuerstein, S. (1991). Mediated learning experience: A theoretical review. In R. Feuerstein, P. S. Klein & A. J. Tannenbaum (Eds.), *Mediated Learning Experience (MLE): Theoretical, psychosocial and learning implications* (pp. 3-51). London: Freund.
- Feuerstein, R., Rand, Y., & Rynders, J. (1988). *Don't accept me as I am*. New York: Plenum.
- Gibbons, P. (2003). Mediating language learning: Teacher interactions with ESL students in a content-based classroom. *TESOL Quarterly*, 37(2), 247-273.
- Hodkinson, H. & Hodkinson, P. (2004). Rethinking the concept of community of practice in relation to schoolteachers' workplace learning. *International Journal of Training and Development*, 8, 21-31.
- Karpov, Y. V., & Haywood, H. C. (1998). Two ways to elaborate Vygotsky's concept of mediation: Implications for instruction. *American Psychologist*, 53(1), 27-36.
- Kozulin, A. (2002). Sociocultural theory and the mediated learning experience. *School Psychology International*, 23(1), 7-35.
- Kozulin, A., & Garb, E. (2002). Dynamic assessment of EFL text comprehension. *School Psychology International*, 23(1), 112-127.
- Lantolf, J. P. (2000). Second language learning as a mediated process. *Language Teaching*, 33, 79-96.

- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Lidz, C. S. (1991). *Practitioner's guide to dynamic assessment*. New York: Guilford Press.
- Lidz, C. S. (2002). Mediated Learning Experience (MLE) as a basis for an alternative approach to assessment. *School Psychology International*, 23(1), 68-84.
- Mahn, H., & John-Steiner, V. (2002). The gift of confidence: A Vygotskian view of emotions. In G. Wells & G. Claxton (Eds.), *Learning for life in the 21st century: Sociocultural perspectives on the future of education*. Oxford: Blackwell.
- McCafferty, S., & Ahmed, M. (2000). The appropriation of gestures of the abstract by L2 learners. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning*. Oxford: Oxford University Press.
- McGonigal, J. A. (1999). Constructing a learning environment that scaffolds science inquiry in first grade. *Learning Environments Research*, 2, 21-41.
- Meloth, M., & Deering, P. (1999). The role of the teacher in promoting cognitive processing during collaborative learning. In A. M. O'Donnell & A. King (Eds.), *Cognitive perspectives on peer learning* (pp. 235-255). Mahwah, NJ: Erlbaum.
- Mercer, N., & Wegerif, R. (1999). Is exploratory talk productive talk? In K. Littleton & P. Light (Eds.), *Learning with computers* (pp. 79-101). London: Routledge.
- Nussbaum, M., Alvarez, C., McFarlane, A., Gomez, F., Claro, S. & Radovic, D. (2009). Technology as small group face-to-face collaborative scaffolding. *Computers & Education*, 52, 147-153.
- Palmer, D. J., Stough, L. M., T.K., B. J., & Gonzales, M. (2005). Identifying teacher expertise: An examination of researcher's decision making. *Educational Psychologist*, 40(1), 13-25.
- Puntambekar, S., & Hubscher, R. (2005). Tools for scaffolding students in a complex learning environment: What have we gained and what have we missed? *Educational Psychologist*, 40(1), 1-12.
- Rasku-Puttonen, H., Etelapelto, A., Hakkinen, P., & Arvaja, M. (2002). Teacher's instructional scaffolding in an innovative information and communication technology-based history learning environment. *Teacher Development*, 6(2), 269-287.

- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. Oxford: Oxford University Press.
- Sinclair, J. M., & Coulthard, R. M. (1975). *Towards an analysis of discourse : The English used by teachers and pupils*. London: Oxford University Press.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp. 144-188). Armonk, NY: M.E. Sharpe.
- Vygotsky, L. S. (1986). *Thought and language*. (A. Kozulin, Trans. & Ed.). Cambridge MA: MIT Press.
- Wegner, D. (2004). The collaboration construction of a management report in a Municipal Community of practice: Text and context, genre and learning. *Journal of Business and Technical Communication*, 18(4), 411-451.
- Wenger, E. (1998). *Communities of practice*. Cambridge, UK: Cambridge University Press.
- Wertsch, J. V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.
- Wertsch, J. V., Minick, N., & Arns, F. J. (1984). The creation of context in joint problem-solving. In B. L. Rogoff, J. (Ed.), *Everyday cognition: Its development in social context* (pp. 151-171). Cambridge, MA: Harvard University Press.
- Williams, M., & Burden, R. L. (1997). *Psychology for language teachers: A social constructivist approach*. Cambridge: Cambridge University Press.
- Wood, D. (1988). *How children think and learn: The social contexts of cognitive development*. Oxford: Basil Blackwell.