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Two Thai Teachers' Perceptions of Cooperative Learning

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Abstract

The need for educational reform in Thailand has become increasingly apparent. Recent policy changes thus have focused on expanding education opportunities and on the implementation of more student-centered pedagogies (Carter, 2006). A suggested way of bringing about the changes necessary to improve the standard of education in primary schools is to incorporate cooperative learning into Thai primary school classrooms.

In order to address the perceived need to introduce socio-constructivist practices such as cooperative learning into Thai schools, the author engaged in an action research study in which she developed and implemented a cooperative learning program within two classrooms in a Thai primary school. This paper focuses on two Thai teachers' perceptions about the benefits of cooperative learning and the roles of the teachers in cooperative learning classroom.

The study found that the two teachers had constructed different levels of perceptions about the benefits of cooperative learning and the roles of the teacher. These findings indicated that Thai teachers who are relatively inexperienced, lacking in confidence and with little or no experience with group work strategies such as peer tutoring need professional development programs conducted over a period of a semester In addition the professional development programs for teachers being conducted over a longer period of time than what occurred in this study, the findings also indicate that teacher professional programs need to provide additional workshops to improve teachers' understanding of socio-constructivist principles underlying cooperative learning and teachers' roles within cooperative learning classrooms.

Key words: cooperative learning, perception, professional development

Introduction

Cooperative learning according to Killen (2007) is where students work together in small groups to achieve a common goal. Cooperative learning is considered to be an effective method to improve teaching and learning processes in the classroom (Johnson & Johnson, 1990; 1999). Cooperative learning is based on the belief that education should be learner-centered and learner-directed, that learners can be teachers and that the teacher is a guide and facilitator rather than the source of all knowledge and direction (Coelho, 1994). However, in many Asian countries such as Thailand, there has been a strong tradition of teacher-centered and teacher-directed instruction (Carter, 2006). In Thailand, this has mitigated against the implementation of cooperative learning teaching strategies within their schools.

Over the past decade, Thai schools have been asked to provide more effective education in order for Thailand to keep pace with an increasingly changing world

Two Thai Teachers' Perceptions of Cooperative Learning

(Becker, 2004). A report from the Ministry of Education (2000) showed that Thai students' achievement does not yet reach adequate standards in mathematics at the primary education level (Ministry of Education, 2000). In response, the Ministry of Education (MOE) has adopted policies called "empowering" educational reforms. These reforms are based on social-constructivist teaching practices that encourage the use of cooperative learning (Hallinger & Kantamara, 2000).

In order to address the perceived need to introduce socio-constructivist practices such as cooperative learning into Thai schools, the author engaged in an action research study in which she developed and implemented a cooperative learning program within two classrooms in a Thai primary school. The teachers who participated in this study were Mrs Supa (a pseudonym), a Grade 3 teacher who had had nine years teaching experience, and Mrs. Malee (a pseudonym), a Grade 4 teacher who had had six years teaching experience. Prior to this study, the teachers had rarely employed cooperative group learning in their classrooms. Mrs Supa only had previously used peer tutoring of low achievers by high achievers. Mrs. Malee's had not utilised any cooperative learning strategies: she perceived that her students were very competitive and did not like to work with friends in groups. This paper focuses on the teachers' perceptions about cooperative learning in their mathematics classrooms.

Procedure

The study proceeded in four stages:

1. Pre-implementation interviews of teachers
2. Teacher preparation
3. Implementation of program
4. Post-implementation evaluation

Pre-implementation interviews of teachers

The researcher interviewed the two teachers prior to their training in cooperative learning. The questions utilised in this interview were adapted from Siegel (2005). Data from the interviews provided the researcher with information about the teachers' perceptions of their classroom contexts, experiences, backgrounds, and perceptions about cooperative learning prior to the intervention.

Teacher preparation

The two teachers participated in a training program consisting of five teacher preparation workshops that were conducted over a period of 1.5 weeks. Each workshop was approximately 2-3 hours in duration. As is indicated in table 1, the five workshops provided both theoretical and practical information derived from a conceptual framework that was generated from an analysis and synthesis of data of research literature from the fields of cooperative learning and socio-cultural theory. During the concluding phases of these workshops, the teachers together with the researcher developed action plans for the application of their recently acquired

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for Research in Education

Two Thai Teachers' Perceptions of Cooperative Learning

knowledge about cooperative learning strategies in two mathematical curriculum units they intended to implement during the following six weeks in their classrooms.

Table 1

Content of five sessions of teachers' workshop

Session	Workshop Content	Theoretical Foundations
1.	Cooperative Learning	(Artzt & Newman, 1999) (Grineski, 1993) (Johnson & Johnson, 2004)
	Introduction of STAD (Student Teams Achievement Division) Model	(Slavin, 1995) (Vygostsky, 1978, 1981),(Rogoff, 1990) and (Scardamalia, 2002)
	Social cultural theories of learning including ZPD (Zone of Proximal Development)	
2	Social Skills	(Johnson & Johnson, 2004) (Johnson & Johnson, 1999)
	Encouraging Participation	(Johnson & Johnson, 1987)
	Teaching teamwork skills (teacher roles)	(Johnson and Johnson, 1999)
	Motivation	(Graves, 1991) (Ryan & Deci, 2000)
3	Face to Face Interaction	(Johnson & Johnson, 1983) (Johnson & Johnson, 1993)
	Self-regulation	(Rojas-Drummond, Hernandez, Velez, & Villagran, 1998)
	Cognitive scaffolding, cultural tools and signs,	(Kozulin, Gindis, Ageyev, & Miller, 2003) (Vygotsky, 1978) (Hausfather, 1996) (Holton & Clarke, 2006) (Clarke, 2001), (Mason, 2000) and (Langford, 2005)
4	Positive Interdependence	(Johnson, 1983; 1999) (Johnson & Johnson, 1993) (Scardamalia, 2002) and (Brett, 2002)
	Knowledge building including notions of individual accountability and epistemic agency.	
	Group process Self-evaluation	(Johnson & Johnson, 1993) (Vygotsky,1987)
5	Discussion and Summarize (Cooperative learning, STAD, Social skill poster, T-chart, Role cards, Scaffolding and Group process.	

Two Thai Teachers' Perceptions of Cooperative Learning

Implementation of program

During implementation stage, each teacher began with two weeks of social skill training (3 times a week) with the students. Then during the next four weeks (3 times a week), the cooperative learning skills were applied in two units of mathematics lessons. In Grade 3, the units focused on geometry and fractions. For Grade 4, the focus was on time and measurement. Observations were conducted by the researcher of the Grade 3 and Grade 4 classes at the different times during the implementation of the program. Video recording, audiotapes, and photographs were used to supplement observation notes data.

Post-implementation evaluation

After the implementation, the teachers were administered individually a final interview regarding their understanding of and perceptions about cooperative learning. They also were asked to describe the use of cooperative learning in their mathematics classrooms.

Analysis of data

The researcher initially transcribed the teachers' interviews. The transcriptions then were translated from the Thai language to English language. Following the transcription of the data into English, the data was coded using a Visual Model of the Coding Process in Qualitative Research based on Creswell, (2005, p. 238). The analysis set out to identify the set of categories that were relevant to the themes of the study. The researcher wrote a summary description of each category.

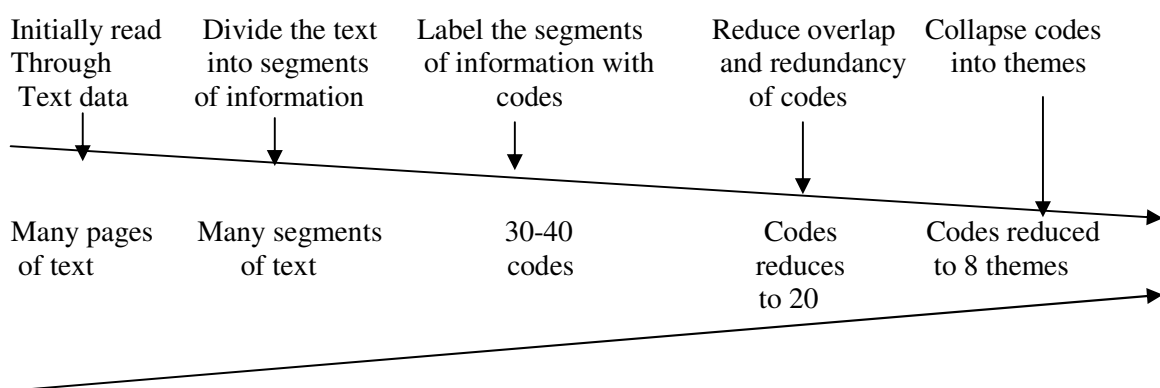| Initially read Through Text data	Divide the text into segments of information	Label the segments of information with codes	Reduce overlap and redundancy of codes	Collapse codes into themes
Many pages of text	Many segments of text	30-40 codes	Codes reduces to 20	Codes reduced to 8 themes

Figure 1 A Visual Model of the coding Process in Qualitative Research

Two Thai Teachers' Perceptions of Cooperative Learning

The analysis of data from the teacher interviews were supplemented by an analysis of data derived from the observation notes, videos and photographs. This data were analysed in a manner similar to that utilised with the interview data. The outcomes of the analysis of data from the teacher interviews and the observation data then were collapsed into eight themes. These eight themes then were cumulated into a set of two categories that revealed similarities and differences in the two Thai teachers' perceptions about cooperative learning.

Results

The outcomes of the analysis indicated that the two teachers' initial and post-implementation perceptions about cooperative learning, whilst having some similarities, however had many differences. The analysis of data revealed two categories of similarities and differences between the two Thai teachers' pre- and post- implementation perceptions about cooperative learning:

1. Perceptions about the benefits of cooperative learning
2. Perceptions about their roles as teachers in cooperative learning classrooms

1. Perceptions about the benefits of cooperative learning

In order for cooperative learning to operate successfully in mathematics classrooms, teachers need to believe in the benefits of cooperative learning (Shachar & Shmuelevitz, 1997). During the course of the study, both Mrs Supa and Mrs Malee gained understandings of and more positive attitudes about the benefits of cooperative learning as they gained more experience in implementing and practising cooperative learning in their mathematics classes. Once teachers have employed cooperative learning in their classrooms, they gain more understanding of the positive benefits of cooperative learning.

The two teachers' increased understandings of and positive beliefs about cooperative learning are illustrated in the transcripts (see Table 2) from the teachers' responses to the question about their perceptions about the benefits of cooperative learning in the initial and final interviews. In the initial interview (conducted during stage 1 of the program), both teachers provided short and rather shallow sets of perceptions about the benefits of cooperative learning. By contrast, their responses to the question in the final interview (conducted during stage 4) indicated that both teachers had constructed more detailed and sophisticated sets of perceptions about the benefits of cooperative learning.

Two Thai Teachers' Perceptions of Cooperative Learning

Table 2

Teachers' perceptions about benefits of cooperative learning

Teachers' Perceptions	Mrs Supa (Grade 3)	Mrs Malee (Grade 4)
Initial	Children can express their ideas and do the right thing. Teachers can build good leaders.	It motivates high achievers to help low achievers. Helping other people can make for merit and virtue. Slow learners can learn from their friends and learn how to accept their disabilities.
Final	Students gain self-esteem. This is because some students in my class (the low achievers) lacked confidence in maths, but when they were working with their friends they had good scores in maths. Furthermore, teachers learn more about the students' characters and learn what the students are like. Teachers also can solve the problems when students are working in a group. Sometimes, teachers do not have a chance to get to every student. When I listen to my students discussing their work within the group, it improves the understanding of my students.	Students learnt to work in teams, helped each other, and accepted other opinions. It made low achievers gain more knowledge in maths. The advantage for the teacher is that the teacher can save teaching time. I had to spend time explaining mathematics concepts to the low achieving students and this made the high achieving students become bored. Sometimes, the students' ability in maths was different. High achieving students can learn faster than the low achieving students.

Although it was noted that both teachers expressed positive beliefs about the benefits of cooperative learning in the initial interview conducted in stage 1, the analysis of their responses indicated different perceptions about the viability of implementing cooperative learning in their classrooms. Mrs Supa (Grade 3) expressed positive viewpoints about the benefits of cooperative learning and indicated that she was confident that it would work well with her Grade 3 students. This confidence was reflected in the efficacious manner in which she planned and implemented cooperative learning in her classroom. By contrast, Mrs Malee (Grade 4) indicated that she was not confident that cooperative learning could be successfully implemented in her Grade 4 classroom. This lack of confidence was not only expressed by what she said but also by her worried facial and body language during the initial interview. Mrs Malee said:

> When they work together in groups, there are many problems occurring. Students will not be happy when the teacher assigns them in groups. Especially, grade 4 students are quite small. Sometimes they cry and stop working altogether, which affects the quality of their study. Students sometimes spend 10 minutes in making groups and this is wasting study time.

As will be further elaborated, the differences in the teachers' initial perceptions about how successfully cooperative learning could be implemented in their classrooms was reflected in the ways they organised the mathematical learning, motivated their students, scaffolded team and mathematical task work, and their evaluation of team work and learning.

Another key finding with respect to perceptions about cooperative learning was that the frequency of practice is a major factor that affects not only the implementation of cooperative learning but also the sophistication and depth of the teacher's perceptions about the benefits of cooperative learning. Mrs Supa employed cooperative learning in her mathematics classroom 3 or 4 periods a week while Mrs Malee only employed cooperative learning in her mathematics class approximately 2 or 3 periods a week. By the end of the study, Mrs Supa had constructed a more sophisticated and in-depth set of perceptions about cooperative learning than Mrs Malee.This finding replicates Shachar and Shumelevitz (1997, p. 65) who found that "teachers who implemented cooperative learning more frequently expressed a stronger belief in the method's effectiveness than those who did not implement the method, or who implemented the method at a low level of frequency".

2. Perceptions about roles of the teacher

How the teacher teaches and what methods the teacher utilises to implement and maintain cooperative learning groups in their classroom ultimately determines the quality of student team work and mathematical learning in his or her classroom (Toumasis, 2004).This is greatly influenced by the teacher's perception of his or her role as a mathematics teacher. Teachers' roles in cooperative learning can be as an academic expert and a classroom manager (Johnson & Johnson, 1990). In addition, teachers must be adaptable to normal classroom conditions that will involve a classroom populated by other children (Blatchford, 2003) and teachers also need to observe for and sensitively make efforts to help outcast students within cooperative learning groups (Jolliffe, 2007). During the implementation of cooperative learning classes, the two teachers performed these roles by:

1. Teaching social skills
2. Teaching students cooperative learning methods and about the advantages of cooperative learning
3. Providing a clear explanation about team roles
4. Motivation of cooperative learning
5. Organisation of mathematical learning tasks and materials
6. Scaffolding of team and mathematical task work
7. Evaluation of group performance

Two Thai Teachers' Perceptions of Cooperative Learning

Teaching social skills

Both Thai teachers felt that the successful implementation of social skills is vital in cooperative learning classrooms. Mrs Supa and Mrs Malee thus trained their students in social skills strategies by using the techniques introduced to them in the pre-implementation workshops such as a social skills posters, and social skills worksheets.

Both Mrs Supa and Mrs Malee agreed that the cooperative learning group social skills could not be taught in one lesson. They both also believed that teachers needed to provide students with opportunities to practice the social skills until they felt comfortable. Mrs Supa noted that "When they kept practicing, they used the social skills more often then they've found that they can use social skills in their group easily".

During their classes, they constantly reminded their students to utilise the social skills with their friends in their teams.

Teaching students cooperative learning methods and about the advantages of cooperative learning

Both teachers indicated that one of their most important roles was to teach cooperative learning methods and the advantages of cooperative group learning to their students. Thus after practice with the social skills, both teachers introduced cooperative learning methods and the advantages of cooperative learning to their students. Mrs Supa noted that even though she had explained the necessity of cooperative learning to her students, some students were still confused about why they had to carry out cooperative learning in their mathematics class. Therefore, she felt that she needed to explain the methods and advantages of cooperative learning to her students many times.

Providing a clear explanation about team roles

In order to perform effectively in their teams, students need to understand different team roles such as coordinator, reader, writer and corrector. In this study, both teachers assigned group roles cards to each group member at the beginning of each cooperative learning session. They then taught their students the importance of team roles and trained them how to engage in each role. The role play cards were rotated from one session to another.

In order for the team roles to be successfully implemented, the teacher needs to be supportive when the students have problems using the role play cards or when they forget the roles. Mrs Malee engaged in the process of reminding and reinforcing the different but complementary team roles less often than Mrs Supa. The classroom observation showed that Mrs Malee less frequently reminded her students to use the role play cards, while Mrs Supa frequently reminded her students about the responsibility they have to their teams.

Paper Presented at the AARE Annual
Conference, Brisbane 2008
Australian Association
for Research in Education

Two Thai Teachers' Perceptions of Cooperative Learning

Motivation of cooperative learning

Both Mrs Supa and Mrs Malee indicated that the extrinsic (e.g., candy or stationery) and intrinsic (e.g., the advantages of working in a group) motivation strategies they employed during the study enhanced the students' group work and their interest in the mathematical tasks.

Problems can occur after the students have been allocated to cooperative learning groups. Mrs Supa indicated that some of her students were angry with each other before the class started and when she found this out, she had to motivate them (using both extrinsic and intrinsic motivation strategies) to convince them to work in a group. Mrs Supa said:

> Sometimes I know that they have argued before, and then
> I tried to motivate them. For example, telling them about
> the advantage of working in a group, talking about the
> reward, or appreciating their work.

Mrs Malee's class also had the same problem with the student personality conflicts. Some of her students did not want to work with their friends in the team, so she needed to solve that problem by telling the students the benefits of cooperative learning and about the rewards they will receive if they work together. Mrs Malee noted that using a reward to motivate the students was a good method. However, she felt that a teacher needs to have other motivation and encouragement techniques in her repertoire.

Organisation of mathematical learning tasks and materials

If mathematical tasks and materials are not well prepared, it may lead to low quality cooperative learning experiences. To facilitate cooperative learning, mathematical tasks need to have the following characteristics: the task is relevant and intrinsically interesting for all the students in a group, every team member can realistically contribute to the successful completion of task, completion of the task should require students to help one another, students should know when the task is completed, the task should be able to be completed in the designated time, and time for discussion and reflection about different solution paths and solutions should be possible(Good, Murlyan, & McCaslin, 1992; Ross, 2000). These criteria were introduced to the two teachers during the teacher preparation workshops.

Mrs Supa prepared mathematical tasks that indicated she had understood and was able to apply most of these criteria. For example, her mathematical tasks were deliberatively designed in such a way that every team member could realistically contribute to the successful completion of the task. This is exemplified by her following comment about a geometry lesson:

> In geometry, I gave them the geometry pictures which
> were on one piece of paper per group and a pair of
> scissors. I let them cut out each picture and to them use
> these pictures to determine the difference in geometric
> shapes. Then I gave them the pieces of paper in
> geometric shapes. Students were very cooperative

because they shared the task and helped each other in group to understand the geometric shapes.

Mrs Supa also set out to ensure that the mathematical tasks were relevant and intrinsically interesting for the students. She noted that tasks that required understanding and analysis tended to be more intrinsically interesting for her students. Thus, in her lessons, she provided her grade 3 students with a variety of tasks that focused on understanding rather than the recall of knowledge. Some tasks took a long time to understand and required complex skills. She also tried to ensure that the tasks were relevant to everyone in the group. She felt that otherwise, the students would not be interested or would not communicate with their friends during the mathematics lessons.

Mrs Supa also set out to design high-quality mathematical tasks that enabled her students' time for discussion and reflection about different solution paths and solutions. She stated that she deliberately tried to ensure that her students could not only finish the tasks on time but also had time left for classroom discussion and evaluation of the teams' products and processes.

In contrast, it was noted that Mrs Malee was not able to initially apply the criteria for the design of mathematical tasks for facilitating high quality cooperative learning by groups of students. Most of her tasks in the first four weeks of the implementation did not meet most of the criteria. She told the researcher that she felt that many of her tasks did not seem to facilitate good cooperative group discussion and learning. In many of her tasks, she observed that not every team member was able to realistically contribute to the successful completion of task. She also noted that many of the tasks she had prepared failed to interest or to motivate all of the students. Also, she felt that many of her tasks did not enable the students to contribute their opinions and ideas towards the solution of the task. She pointed that:

> Some exercises are good only for individuals. When we adapt the lesson for group work, the low achievers never gets the chance to be involved. Also, all the worksheets are always finished by the high achieving students…….I guess that the exercise in the worksheet is not interesting and they can not express their opinion. In the measurement lesson, the classroom equipment (a metre stick) is not enough, so not everyone can measure.

Mrs Malee observed that with many of her earlier tasks, her students were unable to finish the task because not enough time had been allowed for everyone in the group to understand and complete the task. Furthermore, in most of the earlier tasks, most students had not had enough time to teach and explain the lesson to their friends.

Towards the end of the implementation, she began to design tasks that more closely matched the criteria for good cooperative group learning. For example, she reorganised her lesson plans to include only one task per lesson. She now realised that a task should be able to be completed in the designated time. The students in the latter parts of the study thus had time to teach their friends and follow her instructions. She explained:

Two Thai Teachers' Perceptions of Cooperative Learning

> Time management is important for group work. The time
> in each period is limited. There are fifty minutes per day.
> I spend twenty five to thirty minutes in teaching a subject
> matter therefore, it is only twenty minutes left for group
> work. It is not enough for students to work. Sometimes,
> we did not summarise at the end of the period and have to
> summarise in the next period. I think, it would be good if
> we have two hours per day.

She found that by making these few modifications to the design of her tasks, group work experience was improved and every team member was better able to gain mathematic knowledge.

Scaffolding of team and mathematical task work

Mrs Supa proactively scaffolded both social skills and mathematical knowledge-building by encouraging her students to discuss the mathematics and group learning skills with their friends. She said, "I always listen to their conversations and motivated them to talk, discuss, and change their opinion. I helped them to have responsibility for their group and they have to analyse their new knowledge in each lesson". Mrs Supa said she planned to scaffold a different group each day, but she still scaffolded the other groups as well. She spent more time with the chosen group than with the other groups.

The classroom observations noted that Mrs Supa tried to scaffold her students by using of questions such as: "Have you ever seen this question before?", "Why do you answer the questions like this?" "Can you find another answer?" "Are there other opinions from your group?" Mrs Supa said that she used the questions to enhance their understanding of the math problems or the maths questions.

By contrast, although Mrs Malee scaffolded each group equally during her mathematic classroom, her scaffolding operated more in a reactive rather than a proactive way. She scaffolded her students' group work when the problems occurred. If her students could help themselves and perform well in group work, she went to another group. She would spend more time in some groups when they needed help and needed more attention. Also, the major focus seemed to be on scaffolding the completion of the task rather than on the mathematical knowledge-building.

Classroom evaluation

Teachers use classroom evaluation to search for individual students' understanding of mathematics and also their group performance (Johnson & Johnson, 1999: 2004). Mrs Malee evaluated her students' understanding of mathematics by directing a question to one of the students in each team. Sometimes, she picked one student to explain the task in front of the classroom. Most of the chosen students were low achievers.

By contrast, Mrs Supa evaluated her students by informing them that each group had to answer the same questions in order to evaluate their learning of the mathematics. In other words, her evaluations focused much on team interdependence

and advancement of knowledge by the whole team. She could determine the quality of students' team work by listening to or correcting the students' responses.

Summary and discussion

Mrs Supa gained much knowledge about cooperative learning from the teacher preparation workshops and the classroom implementation. Following the teacher preparation workshops, she was able to successfully build on to her rather shallow sets of perceptions about the benefits of cooperative learning. For example, she had developed the following perceptions about herself as a teacher. She felt that she had developed deep understandings about the benefits of cooperative learning, that cooperative learning could work successfully in her classroom, that she could frequently utilise cooperative learning in her classroom, and that she now had an improved repertoire of strategies to facilitate her students' learning and enjoyment of mathematics. Following the implementation of her mathematics curriculum units, Mrs Supa also had constructed advanced perceptions about the benefits of cooperative group learning for her students such as: increased self-esteem in most students, increased confidence especially the low achievers, and better scores in mathematics.

Mrs Malee's perceptions about the benefits of cooperative learning for both the teacher and her students even after she had had six weeks experience in implementing cooperative learning in her classroom were not as well advanced conceptually as those displayed by Mrs Supa at the completion of the teacher preparation workshops. This indicated that Mrs Malee had not gained as much from the teacher preparation workshops and the experience of implementing cooperative learning in her classroom as Mrs Supa had. When interviewed about her perceptions about the benefits of cooperative learning for a teacher, Mrs Malee focused on saving teacher time, especially with low-achieving students, rather than improving the teacher's repertoire of teaching strategies to improve knowledge-building by her students. She also was not confident that cooperative learning could be successfully implemented in her Grade 4 classroom. When discussing the benefits of cooperative learning for her students, Mrs Malee focused on her students' learning how to work in a team but not on the cognitive mathematical knowledge-building benefits for students at all levels of ability. By contrast, Mrs Supa focused on both learning how to work in a team and cognitive mathematical knowledge-building.

Mrs Supa also gained much knowledge about the roles a teacher needs to play in order to facilitate successful cooperative learning in a mathematics classroom. By the end of the study, she had constructed advanced perceptions about the roles of a teacher. This was reflected in her two mathematics curriculum units on geometry and fractions. Mrs Supa provided the appropriate teaching structures to enable students to learn from each other in the cooperative learning classroom by:

1. Reminding and reinforcing student team roles
2. Using intrinsic and extrinsic motivation strategies
3. Preparing quality mathematical learning tasks
4. Providing proactive scaffolding for team work and mathematical knowledge-building

Mrs Malee's classroom implementation of cooperative learning indicated that she had constructed much less sophisticated perceptions about the roles of the teacher than

Two Thai Teachers' Perceptions of Cooperative Learning

Mrs Supa. Mrs Malee's did not remind or reinforce her students about team roles, and many of her tasks did not seem to facilitate good cooperative group discussion and learning. The major focus of her scaffolding was on task-completion rather than on mathematical knowledge-building.

The teachers' construction of different perceptions about the benefits of cooperative and teacher roles can probably be best explained by Mrs Supa having gained both theoretical and practical insights from her experiences in the study. She clearly had developed an understanding of the principles underlying the successful implementation of cooperative learning. By contrast, Mrs Malee had only begun to construct a principled understanding of cooperative learning during the final few days of the study. This is reflected not only in her relatively unsophisticated perceptions about the benefits of cooperative learning but also in her being uncomfortable with the implementation of cooperative learning. Cohen, Brody and Sapon-Shevin (2004) have indicated that if teachers are uncomfortable with cooperative learning, it is often because they have adopted a particular technique without an understanding of the underlying principles.

The findings from this study have clear implications for future implementations of professional development programs for cooperative learning in Thai primary schools. With experienced, confident teachers such as Mrs Supa who have used peer tutoring or other forms of group work, short, intense teacher professional programs such as that utilised in this research study are probably adequate. However, such intense professional programs about cooperative learning are manifestly inadequate for Thai teachers like Mrs Malee. That is, for Thai teachers who are relatively inexperienced, lacking in confidence and with little or no experience with group work strategies such as peer tutoring, alternative, less intense professional development programs conducted over a period of a semester are needed. In addition to being conducted over a longer period of time, the findings from this study also indicate that the alternative teacher professional programs need to provide additional workshops that focus on:

1. Understanding of cooperative learning skills and the advantages of cooperative learning.
2. Reinforcing the importance of team roles to students.
3. Organising mathematical learning task and materials that:
   a. Enable all students to be able to realistically contribute to the successful completion of task;
   b. Are relevant and intrinsically interesting for the students; and
   c. Can be completed in the designated time.
4. Scaffolding not only cooperative learning teamwork but also knowledge-building.
5. Classroom evaluation to address both team performance and individual performance.

These additional workshops should be spread over the course of a semester. This would provide the teachers more time to apply and collectively reflect on the important theoretical and practical knowledge that underlies the principled application of cooperative learning in their mathematics classrooms. Without this principled knowledge, it is doubtful that Thai primary will be able enact learner-centred and learner-directed education in their classrooms.

Two Thai Teachers' Perceptions of Cooperative Learning

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Two Thai Teachers' Perceptions of Cooperative Learning

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