

## **INVESTIGATING PEER LEARNING AND TEACHING IN A PROBLEM-BASED LEARNING CONTEXT**

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*Peer learning and teaching is a powerful mode of learning in motivating the students to become actively engaged and involved learners, and empowering them to take ownership of their own learning. This mode of learning also assists them in achieving a more organised and integrated conceptual understanding of the knowledge learnt. It provides an authentic learning experience for the students, enabling them to exercise their skills in working with, learning from, and communicating with one another, as well as developing themselves into a community of learners.*

*This research explores what actually happened in a series of live student peer teaching and learning sessions during PBL. The process of how the students fulfilled their roles as peer teachers and learners was investigated and observations were made of the students' actions. This sharing aims to highlight areas that the lecturers need to further develop in students so as to optimise their learning from peer teaching and learning.*

### **INTRODUCTION**

The concept of “peer learning and teaching” and its connection with the terms peer group and group learning appear to be frequently referred to in educational literature. A peer is generally described as an equal and, in higher education Goldschmid and Goldschmid (1976) define it in terms of students of similar age and educational level.

Peer learning is defined as students, generally of the same class or cohort, learning with and from each other. Interaction with one another is regarded as one of the means of increasing knowledge and understanding (Falchikov, 2001). Rudduck (1978) explains that the learning that occurs is based on expression, exploration and modification of the ideas of the individual group members.

Peer teaching has been described as “a variety of peer tutoring in which students take turns in the role of teacher” (Falchikov, 2001, p.5). Peer tutoring in turn has been defined as “people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching” (Topping, 1996, p.6). Forman and Cazden (1985) clarify that the peer tutor needs to be more knowledgeable than the tutee, otherwise the experience becomes more of a collaborative learning situation. It is generally recognised that the uniqueness of peers teaching peers lies in the removal of inhibition between members of a peer teaching group so that they are free to admit their learning difficulties to each other (Donaldson and Topping, 1996). Falchikov (2001) agrees that peers appear to have less inhibition in asking each other questions than with their teacher. Thus, Johnson *et al.*, (1991) claim that the most effective teaching method is students teaching students.

Whilst it is recognised that learning is, ultimately, a highly personal act, with the individual requiring “to make sense” of new knowledge within her/himself, the process of achieving learning can, perhaps, be more varied. The process of abstracting meaning from information, providing new information not encountered before, and assisting in the modification of understanding can be carried out by the individual learner. However, the value of peers in being the catalyst and impetus for individual learning is increasingly recognised in higher education. Thus ideas, explanations, elaborations, and even questions from peers could be triggers that propel the learner to search for and construct new knowledge, or modify existing ones.

### ***Understanding how learning occurs in peer learning and teaching***

In peer learning and teaching, two or more people learn and teach each other in a group situation. One view is that peer learning occurs when the peer tutor, who is more knowledgeable, teaches, and the other(s) listen and learn (Lincoln and McAllister, 1993). Another view, which has gained increasing acceptance in higher education, is one which recognises that within a peer learning and teaching situation, the group can transcend mastery of content to generate new knowledge together. The generation of this new group knowledge occurs as the group shares information, discusses, challenges, clarifies and confirms their learning with one another.

In order to reach the stage where the group creates its own unique knowledge one needs to bear in mind the warning by Johnson *et al.*, (1990). They caution that just placing learners in small groups, giving them a task and informing them that they had to work together to complete that task did not mean that the learners would automatically know how to, or be keen to, work and learn together. Bruffee (1999) argues along similar lines, attributing the failure of some collaborative learning experiences to the instructional use of “mere group work”, defined by him as “uninformed, ineffectively organised group work” (p.1). He believes that in such situations, students tend not to abstract and extrapolate knowledge, but rather, remain within the zone of their current knowledge. Thus learning situations need to be carefully planned, structured and managed so that the value of learning in groups can be realised by the students.

***The value of peer learning and teaching to the individual learner***

Several authors believe that the benefits of learning in a group context outweigh those of learning in isolation, and that working with others often increases involvement in learning (Chickering & Gamson, 1991; Piaget, 1950; Vygotsky, 1978; Johnson *et al.*, 1990). Chickering and Gamson (1991) take the view that cooperation with others through sharing of ideas and responding to each other “sharpens thinking and deepens understanding” (p.65). Along similar lines, Piaget (1950) regards the social relationship of cooperation with others, in the form of discussion, collaboration in work, exchange of ideas and mutual control, to be the basis for the development of logic. He believes that discussion with others gives rise to internalised discussion or deliberation, and reflection. Falchikov (2001) agrees with Piaget and posits that the development of a critical attitude of mind, objectivity and discursive reflection is enhanced through cooperative interaction with peers. Slavin explains this further with the claim that:

interaction among students on learning tasks will lead in itself to improved student achievement. Students will learn from one another because in their discussion of the content, cognitive conflicts will arise, inadequate reasoning will be exposed, and higher-quality understanding will emerge. (Slavin, 1995, p.18)

From Falchikov’s and Slavin’s explanations, it appears that cognitive conflict can also occur when students learn on their own and actively engage with the materials by themselves, and is perhaps more easily stimulated and made more rigorous through interactive engagement with peers.

Cognitive elaboration theory offers an interpretation of learning from the perspective of the peer teacher. In order for information to be retained in the memory and related to information already in memory, the learner must engage in some type of cognitive restructuring or elaboration of the material (Wittrock, 1978). A cognitive activity that requires the learner to actively engage in identifying and reorganising the materials is more effective than one that encourages cognitive passivity. Several authors therefore agree that the active learning strategy of preparing, teaching and explaining the material to someone else is one of the most effective ways of learning for the peer teacher (Wittrock, 1978, Whitman, 2001). Bridges and Hallinger claim that:

information is better understood, processed and recalled, if students have an opportunity to elaborate on that information... through discussing the subject matter with other students, teaching peers what they have learned themselves, exchanging views about how the information applies to the problem they are seeking to solve...  
(Bridges and Hallinger, 1998, p.5)

This was apparent in the experiment by Benware and Deci (cited in Whitman, 2001) where students were asked to study an article, the control group being told that there would be a test while the experimental group was told that they would be teaching the materials to others. Whilst the teaching never took place, both groups were tested. It was reported that whilst there was no difference between either group in rote memory work, the group that learnt with the understanding that they would teach others scored significantly higher on conceptual understanding.

What is the value of peer learning and teaching to the peer tutee? This can be explained from the perspective of Vygotsky's (1978) model of the "zone of proximal development". This model emphasises the importance of having "expert scaffolding" but the expert is not necessarily limited to an adult. Falchikov (2001) reports studies involving children teaching and learning as peers, and showing considerable gains in their learning. According to Vygotsky (1978), the strength of peer learning lies in peers, especially of similar ages, being more able to work within one another's zone of proximal development. However a small difference in cognitive level between the peers was more conducive to cognitive growth than a larger difference within the zone of proximal development (Kuhn, 1972). Perhaps a smaller difference is less threatening to the self-esteem of the peer with the lower cognitive level.

### ***The value of discourse in creating group knowledge***

In this paper, discourse is generally defined as 'conversation and discussion' or plainly as 'talk' (Oxford Dictionary, 7th edition). Several authors believe that what students say during peer discourse influences the construction of the cognitive structures of both the speaker and the listener. The principle is that discourse, especially explanatory discourse, encourages the development of more explicit, organised and objective understanding (Hoyles *et al.*, 1990). This agrees with the findings of Webb (1985), who reports that students who provided elaborated explanations to others, tended to gain the most, as they were able to integrate their ideas whilst speaking.

In both their studies, Webb (1985) and Dansereau (1985) conclude that students who received elaborated explanations did not learn as much as those who explained. Nonetheless they learnt more than those working alone. In this instance, the recipient peers would use the new information or ideas from others to construct their new knowledge and thus advance their cognition. However, this method of gaining knowledge, deemed as "vicarious learning", is perhaps less powerful than the active method of searching, articulating and providing the information to others. It is therefore important to structure the learning situation such that the peer learning process is iterative, and that different students are persuaded to provide, as well as receive and question, the information provided by others.

Authors such as Chinn *et al.*, (2000) reveal two interrelated factors that they consider critical in enhancing cognition. Firstly, as indicated in the preceding paragraph, there is the activity of engaging in discourse itself. Secondly, they propose that the quality of discourse is also important. This is seen both in the quality of the elaborations and explanations provided, and in the quality of the questions asked. One of the methods of enhancing quality in discourse, suggested by Chinn *et al.*, is the process of argumentation which is referred to as "presenting reasons and evidence to support different positions" (p.3). In the process of argumentation, it is perhaps inevitable that socio-cognitive conflicts arise when opposing views collide. The resolution of the conflicts stimulates cognitive restructuring, thereby leading to learning and improved understanding (Doise and Mugny, 1984).

Mercer (1995) affirms the importance of peer learning in enhancing cognition by proposing that joint activity provides opportunities for the learners to practise and develop reasoning skills, which he believes does not happen with teacher-led discourse. He suggests a type of talk that is good for solving intellectual problems and advancing understanding:

First, it is talk in which partners present ideas as clearly and explicitly as necessary for them to become shared and jointly evaluated. Second, it is talk in which partners reason together – problems are jointly analysed, possible explanations are compared, joint decisions are reached. (Mercer, 1995, p.98)

In operationalising the above type of discourse, which Mercer calls “exploratory talk”, (1995, p.108), he suggests that students need to follow certain ground rules. Some of these rules, which surfaced in the SLANT (Spoken Language and New Technology) project where he was a researcher, included the need to:

share all relevant information and suggestions, provide reasons to back up assertions, opinions and suggestions, ask for reasons when appropriate, reach agreement about action, accept that the group is responsible for decisions and actions.

### ***The affective dimension in peer learning and teaching***

The affective dimension in education focuses on the feelings and attitudes of the student. Many educators appear to regard student feelings about their learning just as important as the content that they learn. Educators and authors such as Miller and Miller (1997) believe that negative emotions can decelerate the pace of learning, as the student’s concentration is affected. Agreeing with this, McCombs and Whisler (1997) posit that the student’s emotional state tends also to influence their motivation to learn. In summary, both affective and motivational factors have been recognised as influencing learning.

What is the relationship between the affective dimension and peer learning and teaching? It appears that any learning situation, whether done alone or with others, will involve students’ feelings, attitudes and motivation to learn. Hertz-Lazarowitz *et al.*, (1992) suggest that group learning, as opposed to didactic teaching, appears to empower students to learn and with this, to generate within students a responsibility for their own learning. They also propose that peer support, and providing and receiving help from each other, seems to lead to increased engagement in the task and perseverance. Peer norms also appear to encourage individual effort.

As students learn with each other, it is inevitable that cognitive and social conflicts and challenges surface during the process. The ability to handle their own feelings and attitudes, as well as to deal with potential conflict, become important skills. Students need to be trained in such interpersonal skills in order that their learning is not impeded by negative feelings and sub-optimal attitudes towards each other. Several authors and educators such as Johnson *et al.*, (1991), Slavin (1995), and MacGregor (1992), regard the area of interpersonal and small group processing skills as critical success factors in the peer learning context.

This research continues with examining the role of peer learning and teaching from the students’ perspective and experience in the ensuing sections.

## METHODOLOGY

In this paper the working definition of the concept of peer learning and teaching is one adapted from Topping’s (1996) description of peer tutoring, and denotes “students in a group, helping each other learn and also learning themselves in the process.” The research questions to provide focus as to how students teach and learn from each other are:

- What actually happens during the peer learning and teaching process?
- What lessons can we draw from the investigation?

One of the group learning approaches used at Temasek Polytechnic is Problem-based Learning (PBL) where students in small groups are provided with problems, and where they identify and select the concepts or topics to learn by themselves in order to teach their peers in the process of solving the problem together. The learning situations under PBL offered the most observable form of learning with and from peers, since they explicitly factor peer learning and teaching into the procedures and formal tutorial sessions.

The sample selected consisted of students already familiar with the PBL process; they were all third year students in hospitality management. These students had been exposed to the processes of PBL and learning and teaching with peers several times in their three years at the polytechnic. Five students from the third year in the Diploma of Hospitality Management who were processing a problem for seven weeks during the period from late February to April 2002 were selected for the research.

The research method used was researcher observation of the peer learning process. The strategy and research instruments used to investigate the peer learning and teaching situations was as follows:

Strategy:	Research Instruments Used
To observe the peer learning and tutoring process and to analyse the behaviours associated with learning in those instances	a. Video and audio-taping. b. Subsequent use of a structured checklist as criteria to compare actual results (See Appendix 1)

In the PBL learning context the process stages undertaken by the students were:

Stage:	Process:
1	Identifying the problem and learning issues, and selection of learning issues by individual members for studying
2	Self-directed learning of the learning issues
3	Peer teaching of the various concepts to the small group
4	Peer group sharing, discussion and deliberation to complete the task
5	Preparation of the final task

The observation investigated the process of teaching and learning when the small group was carrying out the *peer teaching* (Process Stage 3) and *peer group sharing* (Process Stage 4)

sessions. Video-taping was carried out during one of their peer tutoring sessions and audio-taping was done during one of their peer sharing sessions. The video-taping was to capture the actions, body language, facial expressions as well as voices of the students during the peer interaction. However, for the convenience of the students when they were conducting their peer teaching and learning sessions outside of class, the session was audio-taped. This meant that they were then free to choose their own venue, instead of having to be tied down to the location because of the need to accommodate the video equipment.

A structured observational approach using a checklist was then used to compare salient features of what actually happens with a framework derived from research (See Appendix 1).

## **ANALYSIS AND FINDINGS**

### ***Observation through video recording during the peer teaching sessions***

#### *Peer tutor behaviour*

It was noted that in all five peer-teaching sessions video taped, the peer tutors provided notes to the tutees. How interactive were the notes? One tutor deliberately left some blanks in strategic parts of the notes for the tutees to complete. Another provided a short quiz at the end of the teaching session. Yet another provided a small problem for the tutees to apply the concept. Only one peer tutor used an advanced organiser in the form of a diagrammatic representation to assist students in summarising the points. The insufficient use of advanced organisers was specifically mentioned by the academic staff member in the debrief, and he suggested that MindMaps™ and flowcharts could have more effectively helped the tutees in their understanding.

All the peer tutors explained the various concepts and topics in their own words. Upon stating each point, they then elaborated the point further as they understood it to be. Three out of the five peer tutors provided ample examples and illustrations. One peer tutor illustrated the concepts by recounting his own personal anecdotes. He also used a wide range of industry-relevant incidents that his peers could relate to through personal anecdotes and by recounting his own personal experiences. Two tutors were deficient in providing examples and the academic staff member mentioned this in his debrief to them.

Questions for tutees were limited to three tutors asking recall questions such as “What is a Chief Learning Officer” and “Who does a Food and Beverage Director have reporting to him?” The strategy tutors used at the end of their teaching sessions to elicit questions from their tutees was something simple such as “Any questions?”

In order to help consolidate the peers’ knowledge, one tutor provided a five-minute quiz at the end of her session. However there was no processing of the quiz, and the academic staff member recommended in his debrief that the peer tutor could have asked the tutees to exchange scripts to mark, as that would have assisted their learning as well.

Another tutor provided her peer tutees with a small problem which required them to apply the concepts learnt. This raised several queries and an active exchange of explanations. There was

further need for clarification with the peer tutor as the tutees became aware of their own misconceptions and knowledge gaps.

#### *Analysis of the peer teaching process*

The video tape showed that the peer tutors were mainly using the transmission mode to teach the areas learnt by them. Whilst contextual examples assisted in peppering their teaching with variety and clarification, the tutors asked very few questions to check their tutees' understanding. Neither were the questions the type which would move them to a higher level of cognition, as they were recall questions.

#### *Peer tutee behaviour*

The peer tutees listened intently, completing the blanks with missing pieces of information and recording the examples provided. On the whole, the tutees asked very few questions and these were mainly to seek clarification, rather than to analyse. No peer tutee ventured to voice their opinion, preferring to listen passively to the peer tutor sharing. When one peer tutor shared, two of her tutees subsequently reported during the debrief that they found her teaching "difficult to understand" and her "words not simplified". Yet during her teaching session, none of them stopped her to ask questions, or asked for an explanation.

Only one peer tutor provided her group with a small problem to solve after her explanation. The problem was a good focal piece to gather the group's thoughts and to apply their knowledge. This made explicit some tutees' misconceptions, which they raised for further clarification and which resulted in the peer tutor explaining the principles in greater detail.

#### *Analysis of peer tutee behaviour*

There appeared to be a high degree of passivity on the part of the tutees, and a lack of higher-order types of questions asked, and opinions offered by them. The concern is that even when they were unclear about the teaching of one of their peers, no questions were asked. It appeared that the tutees needed a trigger to encourage them to open up. This was apparent in the group where the peer tutor gave a problem for the application of principles. This generated a fair amount of questioning and some suggestions from the tutees.

#### ***Observation through audio recording during the peer sharing sessions***

This section investigates the observational data gathered during the group sharing and discussion sessions. This stage occurred after the peer teaching sessions and required the group to organise the different concepts into a whole in order to develop possible solutions to the problem. As indicated in Appendix 1, the following critical success factors to learning in groups were used to assess the quality of interaction:

- Sharing relevant information and suggestions
- Providing reasons to back assertions, opinions and suggestions
- Asking for reasons when appropriate
- Reaching agreement about action
- Accepting group decision and action

- Using critical thinking vis-à-vis challenging assumptions and context, exploring alternatives and becoming reflectively sceptical
- Any other pertinent behaviours noted

The audio recording took place over a continuous period of three hours when the students were discussing and evolving the solution to the problem, and the data was analysed according to the list of critical success factors presented.

#### *Sharing relevant information*

From the audio recording, it was apparent that sharing relevant information and suggestions happened frequently during the exchange. Each member of the group extended his or her participation throughout the discussion and shared information willingly. The information was often backed with examples from industry practices that the students encountered during their industrial attachments six months before the interview.

According to Hoyles *et al.*, (1990) and Chinn *et al.*, (2000), engaging in the activity of discourse enhances cognition as it encourages the development of more organised and integrated understanding. This appeared to be happening in the group discussion, as it was apparent that the students were able to elaborate on their explanations and link the concepts with relevant examples from their industrial experience.

#### *Providing reasons to back assertions*

In terms of the quality of discourse as the second critical success factor to enhancing learning, Chinn *et al.*, (2000) suggest that one of the strategies includes presenting reasons and evidence for assertions. From the audio recording, it appears that the usual pattern was the students adding information upon information without a deeper reflection on their contribution. There is no doubt that the reasons and evidence supplied were relevant examples from the hospitality industry which they had experienced. However, bringing the discussion to a deeper level of understanding through engagement in analytical discourse appeared to be deficient, and most of that type of discourse could be traced to one particular student.

#### *Challenging peers*

It was rare that the peers challenged each other over statements they made. Most members of the group appeared to follow the majority voice. Four out of the group of five reinforced each other's line of thought, agreeing and sometimes disagreeing with one another as the discussion developed. On the whole, they were together in their discourse. Only one member eventually voiced her discomfort one hour after the recording of their discussion started:

Z: Can I say something? Do you think that it is a bit out of point from a model? When we talk about a model we don't talk about all these things. A model is very simple...

It transpired that upon her raising the cognitive conflict that was troubling her, the rest of the group also admitted that they were unsure of whether they were on the right track. However,

they were willing to spend time generating what they thought was acceptable in order to present a draft product to their supervisor the next day for his comments.

### ***Issues in group learning***

#### *Negative emotions impeding learning*

This incident raised at least three issues of concern with regard the group learning. The first issue concerned a group member who was unwilling to voice her uncertainty early on in the discussion, although she did raise her concern much later. Perhaps this was indicative of the issue that group learning and consensus generated conformity and non-controversy, discouraged differences, and also produced a power relationship in the group (Trimbur, 1989). Another suggestion for the hesitation in raising the uncertainty could be that the climate of trust and synergy that Dechant et al. (1993) suggest as important was not there. It appeared that on several occasions, the loudest and most vocal voice received the attention and drew the focus.

#### *Lack of ability to handle cognitive conflicts*

The second issue was the peer group's inability to mobilize each other to handle situations where cognitive conflicts arose, and perhaps to generate alternative ways of handling issues. Instead they allowed the pressure of the deadline to cause them to agree, as a group, to short-change their own learning by pressing on and discussing a conceptual model that they had no confidence in.

The third issue was that the rest of the group did not address their peer's concern, but rather, chose to continue discussing their line of thought so as to produce something for discussion with their supervisor the following day. The unresolved cognitive conflict continued to prey on the peer and she was unable to participate fully in the discussion. This was apparent when, 60 minutes after she had raised her first concern, the peer again raised the same concern when the chairperson noticed her not sharing in the group discussion, but was busy writing down her own thoughts. This confirms the suggestion by Miller and Miller (1997) that negative emotions can decelerate the pace of learning, as the student's concentration is affected.

The group subsequently allowed her time to voice her thoughts. However, as her sharing was rather garbled, the sense was lost to the rest of the group. Instead of asking her to summarise her thoughts in diagrammatical form, perhaps, the group again decided to carry on with their version, although they conceded that they would inform their supervisor that their group was submitting two versions.

The positive side of this episode revealed the group's effort in managing a potential conflict. Although voices were raised a decibel the second time the issue was raised, none of the students lost his/her temper. Even though the rest of the group did not actually understand the peer's explanation, they were willing to compromise by suggesting submission of two versions for discussion with the supervisor. This helped to diffuse the tension and the peer subsequently joined the remaining discussion. However, the compromise impeded further learning of the correct content and restricted the development of the necessary process skills

required to address the problem of sub-optimal learning that seemed to have occurred in this group.

### ***Strengths and issues arising from the case study on peer learning and teaching***

The researcher observation noted that the students took ownership of their own learning by preparing notes with explanations and examples for their peers. In the collaborative peer sharing part of the process, the group willingly shared information and resources with each other in order to assist one another in making further sense of their learning. All these concur with the views of educators such as Chickering & Gamson (1991), Piaget (1950), Vygotsky (1978) and Johnson et al. (1990) that working with others often increases involvement in learning.

The results of the research appeared to indicate that this mode of learning is of greater value to the peer tutor in terms of learning the content. The researcher observation noted that the peer tutors provided notes and contextual examples to their tutees. However, the tutors mainly used the transmission mode to deliver information about the areas taught by them and asked very few questions to check their tutees' understanding. The questions were also not of the type to move the latter to a higher level of cognition as they were mainly recall questions. It could be argued that the issue of using the transmission mode of teaching and level of questioning affects the quality of learning of the tutees more than that of the tutors. For the latter, preparing to teach and teaching their peers meant that the tutors were able to restructure their own conceptual understanding and thereby achieve deeper understanding of their areas learnt and cognitive gains in learning. This echoes the postulations of educators such as Wittrock (1978), Whitman (2001), Bridges and Hallinger (1998). It is therefore important that reciprocal peer teaching be encouraged, so that each student has an opportunity to teach his/her peers.

Among the peer tutees, the researcher observed that there was generally a high degree of passivity during the peer teaching sessions, a lack of higher order types of questions asked, and a lack of opinions offered by the peer tutees. One of the four groups did not ask questions or requested for further elaboration even though the members were unclear about the teaching of one of their peers. Only in one group did the peer tutor pose a problem at the end of her tutoring session to provide her tutees with the opportunity to apply the new information. This was the trigger that generated a fair amount of questioning, suggestions and active engagement by the tutees. This perhaps suggests the need for proper training in the peer tutoring process as well as in questioning skills. Another possible reason for the lack of request for assistance by peers could be that the request may be regarded as demeaning to the one asking. This theory, posited by Holmans (cited in Falchikov, 2001), proposes that requesting assistance from an equal might suggest personal inadequacy and results in reduced self-esteem.

During the peer sharing sessions, it was observed that engaging in discourse provided the means for the students to develop more organised and integrated understanding. However, the depth of analytical discourse about the issues raised during the discussion appeared to be deficient. It was also rare that the peers challenged each other and asked for reasons for the statements they made. A cognitive conflict that arose in one of the peers revealed that the

group did not appear to be equipped to manage such situations. Firstly, the one in conflict did not harness her peers as resources to investigate her concern further. Secondly, the peers did not address her concern, but rather ignored it. This caused the problem to continue festering in the peer, until it erupted again sometime later. It was only then that the group negotiated for a compromise which appeased the peer, although the cognitive conflict was still not settled. The positive side of the episode was the group's handling of a potentially explosive situation-in-conflict. However, this was at the expense of a deeper level of learning which might have been achieved if they had managed to resolve their cognitive conflict, perhaps using problem-solving techniques.

## **RECOMMENDATIONS AND AREAS FOR IMPROVEMENT**

Several areas of strengths and concerns emerged from the research. In order to further strengthen the students' learning through this instructional mode, the following areas for improvement are recommended to address the concerns noted.

Generally the improvements fall under the categories of training the students, monitoring their progress in these areas, and providing feedback and follow-up on:

- their role as the peer tutor, including the procedures of peer tutoring. In particular, training should include the design and incorporation of active learning strategies within their teaching sequences in order to check their tutees' understanding, as well as crafting questions, small problems and exercises that elicit higher order thinking from their tutees.
- their role as the peer tutee. Perhaps a better understanding of their role as peer tutees might alleviate the problems associated with passivity and the expectation of the peer tutor taking charge. Training in increasing self-esteem and assertiveness, and handling self-perceptions such as personal inadequacies, might lead to increased participation and reduced self-consciousness in requesting assistance.
- cognitive skills such as questioning, managing and contributing to explanatory discourse, critical and reflective thinking, and so on. Self-checking and self-analysis skills are also important, and these might alleviate the issue of whether the content provided by their peers are valid and adequate.
- group skills such as teamwork, managing cognitive and social conflict, cooperative and collaborative learning, and so on. Putting students in a group situation does not necessarily ensure successful learning from each other.
- Proper design and management of learning situations; the two critical success factors of reciprocal peer tutoring and collaborative group discourse need to be incorporated. The latter two aspects will ensure that the benefits of learning are distributed among the peers.

## CONCLUSION

This research aimed at exploring the role of peer learning and teaching in supporting learning. What it discovered is that peer learning and teaching is a challenging strategy to adopt, and requires careful preparation, training, monitoring, feedback and follow-up of the students in a range of skills in order to prepare them for this mode of learning.

On the positive side, this strategy was found to be a powerful mode of learning in motivating the sampled students to become actively engaged and involved learners, and empowering them to take ownership for their own learning. This mode of learning assisted them in achieving a more organised and integrated conceptual understanding of the knowledge learnt. It also provides an authentic learning experience for the students, in enabling them to exercise their skills in working with, learning from, and communicating with each other, as well as developing themselves as a community of learners.

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### Checklist of Peer Learning and Teaching Behaviours

**Group Observed:** \_\_\_\_\_

**Time & Date of Observation:** \_\_\_\_\_

The analysis of the peer teaching and learning sessions will be carried out by the researcher, based on video and audio tapes of the sessions. This analysis attempts to elicit the following behaviours among the small group members.

*Section 1: During the peer teaching sessions*

<b>Peer tutor behaviour:</b>	
- issue of notes to the tutees	
- use of examples and analogies	
- ask tutee questions	
- ask tutee for questions or contributions	
- use of organisers	
- explaining in own words	
- any other pertinent behaviours noted	
<b>Peer tutee behaviour:</b>	
- ask tutor questions and clarifications	
- voice opinions, views, sharing and understanding	
- any other pertinent behaviours noted	
<b>Others:</b>	
- quality of exchanges by tutor, analysed using the SOLO framework of Biggs (1999 p.38)	
- quality of exchanges by tutee, analysed using the SOLO framework of Biggs (1999 p.38)	

**Checklist of Peer Learning and Teaching Behaviours (continued)**

*Section 2: During the peer group sharing sessions*

- sharing relevant information and suggestions
- provide reasons to back assertions, opinions and suggestions
- ask for reasons when appropriate
- reach agreement about action
- accept group decision and action
- use of critical thinking vis challenging assumptions and context, exploring alternatives and becoming reflectively sceptical
- any other pertinent behaviours noted

Note:

The checklist in Section 1 is elicited from the following references and sources:

- Biggs, J. (1999). *Teaching for Quality Learning at University*, p. 38. Buckingham: SRHE and Open University Press.
- Jaques, D. (2000). *Learning In Groups*. 3<sup>rd</sup> ed. London: Kogan Page
- Johnson, D.W., Johnson, R.T. & Smith, K.A. (1991). *Cooperative Learning: Increasing College Faculty Instructional Productivity*. ASHE-ERIC Higher Education Report No. 4. Washington D.C.: The George Washington University, School of Education and Human Development.
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- Student participants feedback

The checklist in Section 2 is adapted from Mercer’s “exploratory talk”, (1995, p.108), and Brookfield’s “critical thinking” (cited in Jarvis et al., 1998):

- Jarvis, P., Holford, J. & Griffin, C. (1998). *The Theory and Practice of Learning*. London: Kogan Page.
- Mercer, N. (1995). *The Guided Construction of Knowledge: Talk Amongst Teachers and Learners*. Avon: Multilingual Matters Ltd.