Doing it Differently: The Ups and Downs of Peer Group Learning

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Peer group learning is the name we have given to a particular type of collaborative learning that has been implemented as part of an action research project designed to improve teaching and learning of first year university mathematics at James Cook University. Using an innovation-decision process model we analysed the response of academics to the implementation of the peer group learning initiative. The analysis reveals that the action research methodology allows generally positive attitudes regarding the initiative to surface.

Collaborative learning takes a range of forms. It can be broadly described as "a *situation* in which *two or more* people *learn* or attempt to learn something *together*," (Dillenbourg, 1999, p. 1). In any given circumstance the intended purpose of the collaborative learning will influence the choices made with respect to the number of participants (ranging from a pair to hundreds or thousands), what is to be learned (e.g., problem solving or communication skills), and the form of the interaction (e.g., weekly, monthly, in the same room, on-line, with peers or with a teacher). Potential benefits include the fostering of learning communities, the provision of cooperative rather than competitive environments and opportunities for active learning (Laal & Ghodsi, 2012).

The Mathematics Action Research Team (MathsART) at James Cook University (JCU) introduced collaborative learning to the first year mathematics subject MA1000 for the first time in Semester One, 2011. We describe the style of collaborative learning as peer group learning – (see next section for details).The MathsART anticipated the following benefits:

- Students would work together and need to communicate mathematics – requiring them to process ideas differently from when they study the material on their own.
- The peer groups would legitimise the practice of discussing mathematics with fellow students, thereby diminishing the common perception that it is only the lecturer or tutor who can be the teacher of mathematics. This, in turn, would facilitate a move to independent learning.
- The peer groups would help build a sense of community amongst the students, providing a social network for moral support. This is particularly useful during the transition from secondary to tertiary study, and for those students who commence tertiary study without a support network to rely upon.

The introduction of peer group learning represented a significant shift in strategy in teaching first year mathematics at JCU and caused considerable discussion and debate.

The MathsART project facilitates change in practice. One aspect of practice that changes through an action research project is that of the conditions in which the practice occurs. Kemmis (2009, p. 463) describes "transforming the conditions of practice" as "transforming the ways we *relate* to others and to things and circumstances around us." This paper focuses on the academics involved in the implementation of peer group learning and discusses their response to this initiative after having implemented it. In particular, the MathsART response to the concept of peer group learning is explored at the time of the first formal feedback from the students regarding the teaching and learning in MA1000 in Semester One, 2011. The feedback was in the form of a tutorial representative meeting five weeks after the

commencement of the semester. This moment may be regarded as a critical incident, a time at which the transformations Kemmis (2009) describes should be apparent. It was always the intention of the MathsART to use the first formal feedback from the students as an opportunity to review the format of the peer group learning initiative and modify it as necessary. This provided motivation for the team to reflect intently on the feedback from the students and on their experiences in teaching the subject.

Changing Practice: Analysis of the Response of the MathsART to the Peer Group Learning Initiative

Description of the Peer Group Learning Initiative

The peer group learning initiative was implemented in MA1000 during the second week of semester, after students had been introduced to the concept at the lectures in the previous week. In this subject, tutorial classes comprise at most 25 students. During its first meeting, each tutorial class was informed that one of the purposes of the tutorial was: "to strengthen and develop the techniques and concepts presented in lectures through **independent** and **collaborative** learning experiences in a safe and supportive learning environment" (tutorial notes). They were also informed that the collaborative learning was to involve students working in small groups.[1] The expectations were presented as follows:

1. Each group will meet at least once per week outside of the lectures and tutorials.
2. The group should discuss the exercises that have been covered in lectures.
3. All members should participate: asking questions and helping each other.
4. One member from each group will email the tutor regarding the issues the group could not work through in the meeting.
5. Group emails will be sent to the tutor before 5pm Friday afternoon.
6. These issues will be addressed at the tutorial in the following week.

The initiative was low risk, for both academic staff and students, because groups were self-selecting and no assessment was directly linked to group tasks.

The Data Analysed and the Analytical Framework

All tutors of MA1000 in 2011 were MathsART members. They wrote weekly reflections during semester and contributed to MathsART meetings which were usually held weekly. Ethics approval was granted for collection of data from students. Consent was obtained from students to record meetings, which they participated in for the purpose of providing feedback to MathsART. Given the focus of this study, the data analysed consist of the recording of the MathsART meeting of 5th April 2011, which followed four days after the first tutorial representative meeting. A content analysis of this MathsART meeting was conducted to interpret the response of MathsART to the peer group learning initiative.

To analyse the response of the MathsART to the introduction of collaborative learning we use a model for the *innovation-decision process* presented by Rogers (2003, pp. 168-218). He describes a process through which a decision-making unit[2] (such as MathsART) makes a decision to adopt or reject an *innovation*. In this paper the innovation is the

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[1] Recommended group size was 4 or 5, however this was not enforced.

[2] A decision-making unit may comprise one individual or a group of people.

introduction of peer group learning. At the coarsest level, the various stages of the model are: *Knowledge, Persuasion, Decision, Implementation,* and *Confirmation.*

It is the actions that a group takes at the various stages of the model that provide insight into the beliefs and attitudes they hold concerning an innovation. Since the peer group learning initiative was already implemented, the study presented here focused on the last two stages of the model, Implementation and Confirmation. Table 1 gives brief descriptions of these stages and some of the possible actions a decision-making unit might take in each that are consistent with a changing perception of the innovation. For example if the MathsART made a decision to discontinue peer group learning in MA1000 it would indicate the team's attitude toward the approach was negative in some way.

Table1
Last Two Stages in Rogers (2003) Innovation-decision Process and Possible Actions

Stage and description	Possible actions altering the form of the innovation
Implementation (p. 179) – occurs when a decision-making unit puts an innovation to use.	*Reinvention* (p. 180) – occurs when an innovation is changed or modified by the user in the process of its adoption and implementation.
Confirmation (p.189) – occurs when the decision-making unit seeks reinforcement for the innovation-decision already made.	*Dissonance* (p. 189) – may lead to (a) the search for an alternate innovation, (b) a new decision regarding, or implementation of, an alternate innovation or (c) reversal of the original innovation decision.

Note. Page numbers indicate the relevant pages in Rogers (2003).

Analysis of the Challenges and Resolutions

Eight of the 11 tutorial representatives and the three of the tutors in MA1000 attended the 70 minute tutorial representative meeting. The peer group learning aspect of the subject was discussed for approximately 20% of the time. Four days later 25% of the two hour MathsART meeting was dedicated to the peer group learning initiative. What follows is summary of challenges and associated resolutions concerning the peer group learning initiative that were discussed at the MathsART meeting.

Negative sentiments. While there was agreement that the student representative meeting presented a generally favourable view of the peer group learning experiences in MA1000 there was some concern regarding the nature of the sample of data provided. One participant of MathsART noted:

> Although after the tutorial rep meeting we said, "it seems as though the groups are working well," there was minimal feedback and I think those people that did come to the rep meeting … were the positive ones. I think there will be more negative attitudes to group work than positive.

This comment reflects the opinion that self-selected tutorial representatives may have a bias toward positive attitudes regarding new initiatives. In response, the MathsART developed an online survey instrument to obtain feedback from a greater percentage of the class, thereby reducing the possibility of bias.

Disruptive groups. The MathsART observed some peer groups that were disruptive, either disturbing some of their own members or other classmates in the tutorial. The resolution implemented in 2011 was to assist students in finding new peer groups.

Collapsed groups. The tutorial representative meeting provided data indicating some peer groups were no longer meeting. A number of suggestions were made to overcome this challenge. These included engineering the groups according to mathematical ability, so that there was some certainty that each group had at least one member who had relatively strong mathematics skills. This suggestion was not implemented in 2011, although it may be implemented in the future. Instead the resolution to the previous challenge was adopted.

Tutor not meeting obligations to group. One tutorial representative indicated some peer groups were no longer meeting because the tutor failed to respond to all the issues that arose in the email he received listing areas of concern. While time constraints precluded attending to all concerns raised via email, this omission reduced the value of the tutorial for these peer groups. The resolutions proposed include looking at the provision of solutions that provide differing levels of scaffolding and are designed to be used by groups. This would reduce the email traffic to the tutor. This ambitious project is being implemented for 2012. For the 2011 cohort, fully worked solutions were provided immediately.

Discussion and Conclusion

The analysis presented in the previous section indicates the MathsART responded to most of the feedback from the tutorial representative meeting by resolving to alter aspects of the peer group learning initiative. With respect to Rogers (2003) model, it is possible to interpret the peer group learning initiative as belonging to either the Implementation or Confirmation stages at the time of the data collection. The resolutions may therefore be classed as Reinvention, or Dissonance. Rogers (2003, p. 189) explains that when dissonance regarding an existing innovation occurs and is reduced by a decision to implement a new initiative, the behaviour of the decision-making unit is consistent with a change of attitude. In this study the attitudes are with respect to the peer group learning initiative. Given the positive nature of the resolutions proposed, we have observed the MathsART experience positive feelings towards the peer group learning initiatives introduced. Undoubtedly, this is due to a combination of the belief that teaching and learning can be done differently and the understanding that the action research methodology offers an approach to ensuring innovations can be iteratively improved to achieve desired outcomes, or abandoned if there evidence to suggest they will not work.

Acknowledgement

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