

## Does pre-feedback self reflection improve student engagement, learning outcomes and tutor facilitation of group feedback sessions?

Anne Gardner (Anne.Gardner@uts.edu.au), Dr. Keith Willey (Keith.Willey@uts.edu.au)

University of Technology, Sydney, Australia

**Abstract:** *The authors have previously reported the effectiveness of using self and peer assessment to improve learning outcomes by providing opportunities to practise, assess and provide feedback on students' learning and development. Despite this work and the research of others, we observed some students felt they had nothing to learn from feedback sessions. Hence they missed the opportunity for reflection and to receive feedback to complete the learning cycle. This behaviour suggested that students needed more guidance to facilitate deeper engagement. We hypothesised that student engagement would increase if they were provided with guiding 'feedback catalyst questions' to initiate reflection and facilitate effective feedback on learning outcomes. In this paper we report testing whether this approach assisted students to gain more benefit from the self and peer assessment feedback sessions. In our investigation both students and tutors were asked to evaluate the effectiveness of the feedback catalyst questions in improving student engagement and learning. We found that the pre-feedback self reflection exercise improved learning outcomes and student engagement with more than 80% of students reporting multiple benefits. Furthermore tutors reported that the exercise assisted them to facilitate their sessions. However, not surprisingly the degree of success was related in part to the attitude of the tutor to the exercise. This suggests that while the feedback catalyst questions were extremely effective there is no substitute for enthusiastic and engaging tutorial staff.*

### Introduction

It is frequently difficult for an academic to fairly assess the contribution of individual students to a team project since most of the work may have occurred outside of scheduled lecture or tutorial times. Self and peer assessment is often used as a means of handing over assessment of an individual's contribution to a team task to the team members themselves (Johnston & Miles, 2004). In addition to providing fairer assessment, self and peer assessment is reported as assisting students to develop important professional skills including reflection and critical thinking (Mello, 1993; Somervell, 1993). Falchikov and Goldfinch (2000) reported a link between high quality design of assessment tasks and more valid peer assessments, a view supported by Freeman and McKenzie (2002). Michaelsen discusses the use of self and peer assessment to promote peer learning (Michaelsen et al., 2004), while Willey and Freeman (2006a, 2006b) report using it to produce formative learning-oriented feedback to complete the learning cycle and encourage the ongoing development of skills. Furthermore Boud and Falchikov (2007) discuss its use for developing students' skills for lifelong learning. More recently the authors have reported the effectiveness of using self and peer assessment to improve learning outcomes by providing opportunities to practise, assess and provide feedback on students' attribute development (Willey & Gardner, 2008a). This research resulted in the development of a self reflection and peer feedback framework to improve student engagement and learning outcomes. Despite this work and the research of others, many students and academics perceive self and peer assessment to be primarily an instrument to facilitate fairness, focusing on its free-rider deterrent capacity, rather than providing opportunities for reflection and feedback to complete the learning cycle (Willey & Gardner, 2008b).

In previous research the authors found when self and peer assessment was used in conjunction with group projects to provide feedback and promote learning, many students in well functioning teams commented that they had little to discuss as everyone in the team 'pulled their weight'. Typically they did not take the opportunity to discuss how they could have improved their work and hence missed the opportunity to benefit from feedback that should assist their ongoing professional development or potentially improve their grade in subsequent assessment tasks or subjects (Willey & Gardner, 2008c). As a result of this research feedback sessions were changed to focus on learning and not just assessment outcomes.

In an effort to increase the 'on task' participation and engagement of students, and also assist tutors in facilitating the feedback sessions, the authors devised a series of 'feedback catalyst questions'. A catalyst is a substance that increases a chemical reaction, and our intention was that these questions would increase the learning that resulted from the feedback sessions. The actual questions were influenced by the development planning questions suggested by Dominick et al (2001). Students were asked to reflect on these questions and write responses prior to their peer feedback sessions. The questions were designed to support the self and peer assessment process and help students to view self and peer assessment as a method of receiving valuable feedback about their learning and not just as a way of exposing group 'free-riders' and/or teamwork problems.

Establishing a habit of student reflection aligns with graduate competencies required by our professional accreditation organisation, Engineers Australia. One of the required Professional Attribute competencies is that graduates should be able to: 'take charge of own learning and development; understand the need to critically review and reflect on capability, invite peer review, benchmark against appropriate standards, determine areas for development and undertake appropriate learning programs.'

In this paper we report investigating whether having to write responses to 'feedback catalyst questions' improved reflection, increased students' attention to their learning outcomes, both individually and in their groups, and improved tutors' facilitation of the feedback sessions.

## Background

The trials were implemented in the course Design Fundamentals. Design Fundamentals is a second year compulsory course in all engineering programs at the University of Technology, Sydney. The subject's typical cohort is 300+ students with tutorial classes being limited to a maximum of 32 students.

The subject's primary aims are to:

1. Develop students' understanding of the engineering design process
2. Provide students with the skills to develop a small engineering project from initial concept to the production of a prototype.
3. Continue the development of students' professional skills including teamwork, critical evaluation, feedback and communication commenced in earlier subjects.

To promote the development of professional skills, provide students with feedback, improve students' judgement and critical evaluation skills and encourage academic honesty, a process of self and peer assessment (collected using the online tool SPARK<sup>PLUS</sup> (Willey, 2010) was integrated into four distinct peer learning assessment tasks that, when combined, form a major design project.

After two of these tasks students used SPARK<sup>PLUS</sup> to rate their own and their team peers' contribution to each of the following deliverables which form part of a major project:

1. **Requirement Specification:** each group of four students produces a requirement specification report for their design product, chosen in an earlier assessment task.
2. **Project Report, Oral Presentation and Prototype Demonstration:** each group of four students produces a project report, makes an oral presentation and presents their prototype design.

The SPARK<sup>PLUS</sup> Self and Peer Assessment (SPA) factors for each task are used to produce individual marks by moderating the mark received for the group's submission.

In previous semesters these activities were followed (in the first tutorial after the deliverables were submitted) by a facilitated peer feedback session (Willey & Gardner, 2008b). In the trials reported in this paper the feedback catalyst questions were used prior to these feedback sessions.

## Method

In the first tutorial after the submission of assessment tasks, groups are guided through a feedback process which includes the individual SPARK<sup>PLUS</sup> results being distributed to all group members and discussed (for further details see Willey & Gardner, 2008b). In Autumn semester of 2009 this process began with students writing responses to the following feedback catalyst questions:

1. Examples of tasks I did particularly well, or ways I was particularly effective for this report are:
2. Some specific things I could do to be even more effective in the future include:
3. Based on the above my SPA values are a valid/invalid assessment of my contribution to this report.
4. Examples of skills/behaviours I learnt from other members of my team include:
5. Some specific skills/behaviours that other team members could improve to make their contribution more effective include:
6. Some specific things I recommend that we as a team do in the future to be more effective are:
7. (After the marked reports are distributed) If we had another 2 hours to work on this report what aspect of the report should we work on and what tasks would have the greatest impact on our results:

Students then shared their responses to these questions with their group. The in-class discussion concluded with groups agreeing how to improve their overall team and individual performance for the remaining parts of the project and /or in future group work opportunities.

After the first feedback session, paper-based student surveys were collected from five of the ten tutorial groups (225 students from a class cohort of 304, ie. 74% of the student cohort were surveyed). All tutorials were invited to participate in this research, however four tutors did not survey students in their tutorial group. In some cases this was simply because they forgot to conduct the surveys. The survey consisted of four questions in a six point Likert format (Strongly Disagree to Strongly Agree), and one question where students were asked to mark a response on a % scale. Two of the survey questions were for those students who were repeating the subject, and these elicited responses from 65 of the 225 respondents (29%).

The subject tutors were also surveyed as to their perceptions of how useful the feedback catalyst questions were in assisting them to facilitate their feedback sessions. Although there were ten tutorials, one tutor was responsible for two tutorials so there was a total of nine different tutors, three of whom had not previously tutored in Design Fundamentals, one of these having not previously tutored any subject at all. Seven of the nine tutors responded to the survey which consisted of a mixture of free response and six point Likert format questions. Tutors' responses were analysed both collectively and compared to the responses from students in their tutorial.

With the students' permission, tutors from five tutorials chose to collect the students' written responses to the feedback catalyst questions. Responses were collected from two tutorial groups after the submission of the first group assessment task, the Requirements Specification report, and from three tutorial groups after the submission of the second group assessment task, the Design Brief report. While it was not our original intention to collect this material, we found them to be a rich source of data and subsequently chose to collate, analyse and report these responses in this paper. The qualitative data management software NVivo was used to facilitate this analysis.

## Results

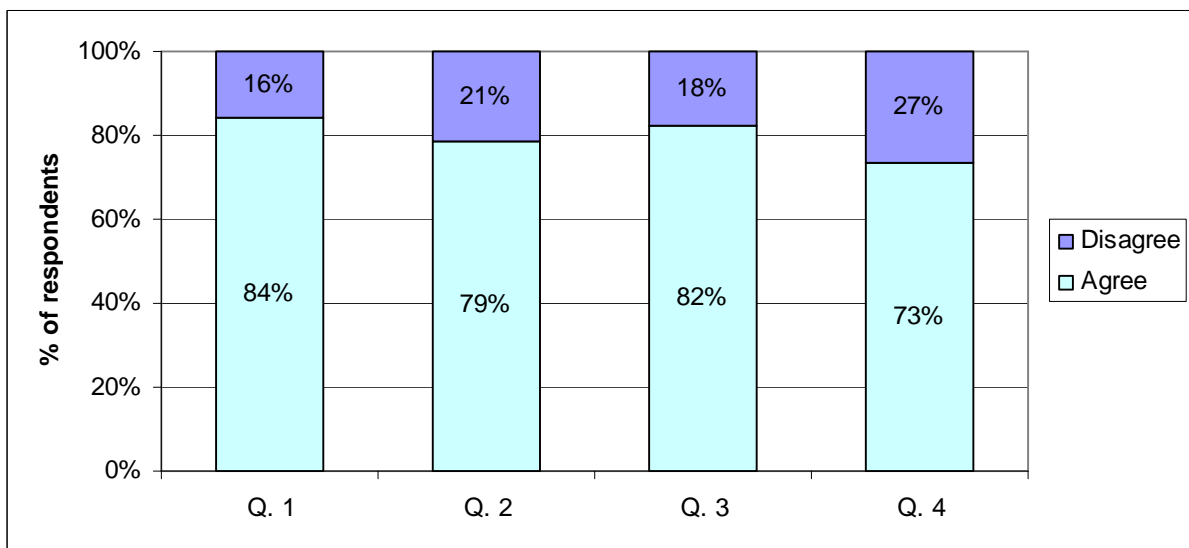
### Student Surveys

The student surveys included the questions listed in Table 1. Responses to these questions are plotted in Figures 1 to 5. To simplify the analysis, in Figures 1 to 5, the Strongly Agree, Agree and Slightly Agree responses were combined to a single 'Agree' response, and the Slightly Disagree, Disagree and Strongly Disagree responses were combined to a single 'Disagree' response.

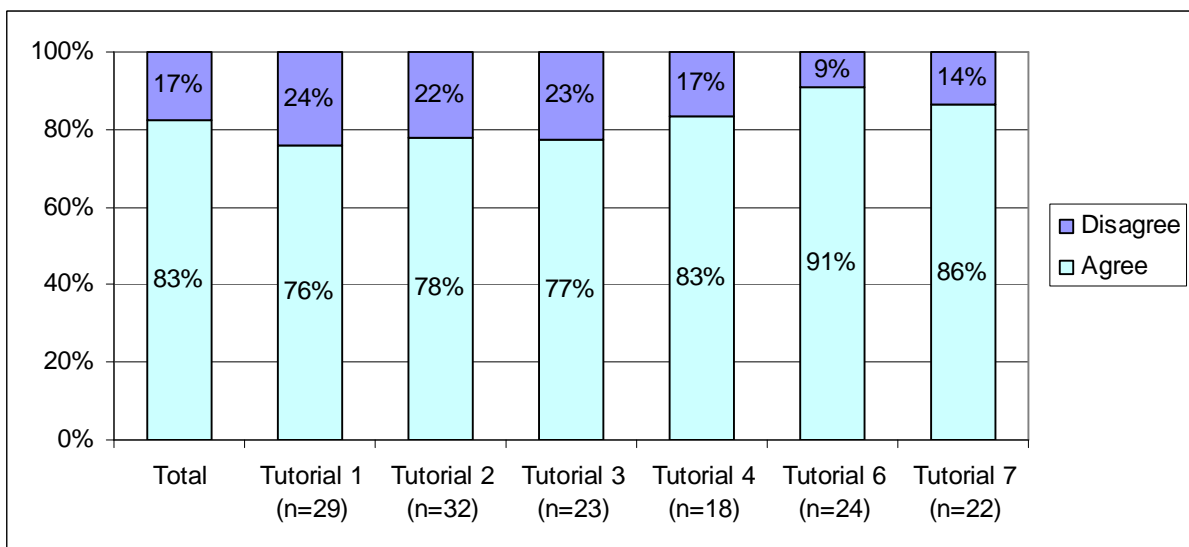
In Figures 2 to 5 the student responses are reported for individual tutorial groups.

**Table 1: Student survey questions**

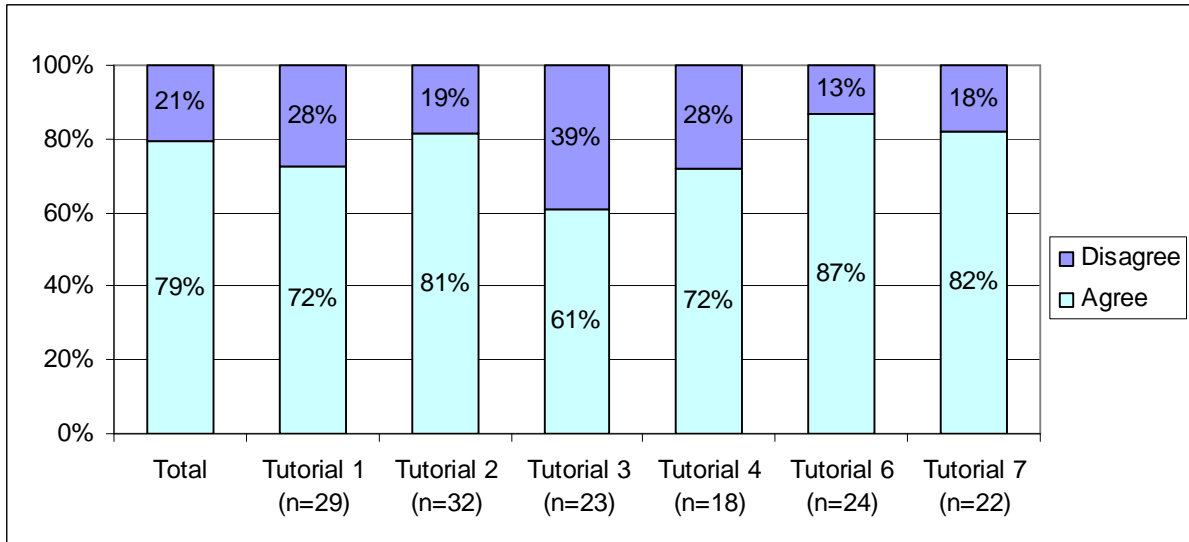
Question 1	Having to write responses to the 'Feedback Catalyst Questions' facilitated my thinking about my behaviour and the behaviour of my team in producing the Requirements Report.
Question 2	Having prepared written responses to the 'Feedback Catalyst Questions' meant that I had more meaningful conversation and provided more effective feedback than would have most likely been the case without the prior reflection that occurred as a result of completing the feedback questions.
Question 3	The 'Feedback Catalyst Questions' helped my team explore ways to improve our team processes and behaviours for the next group assessment task
Question 4	If you are repeating this subject: I think that using the 'Feedback Catalyst Questions' made the feedback sessions more productive than those I undertook previously in the subject.



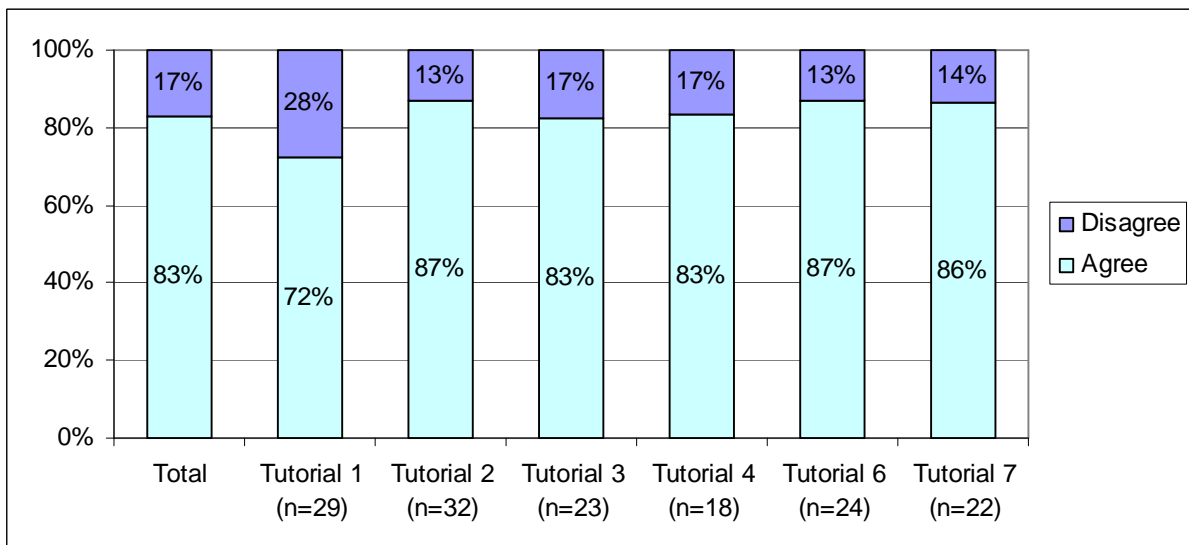
**Figure 1: The response of all students to the four survey Likert format questions**



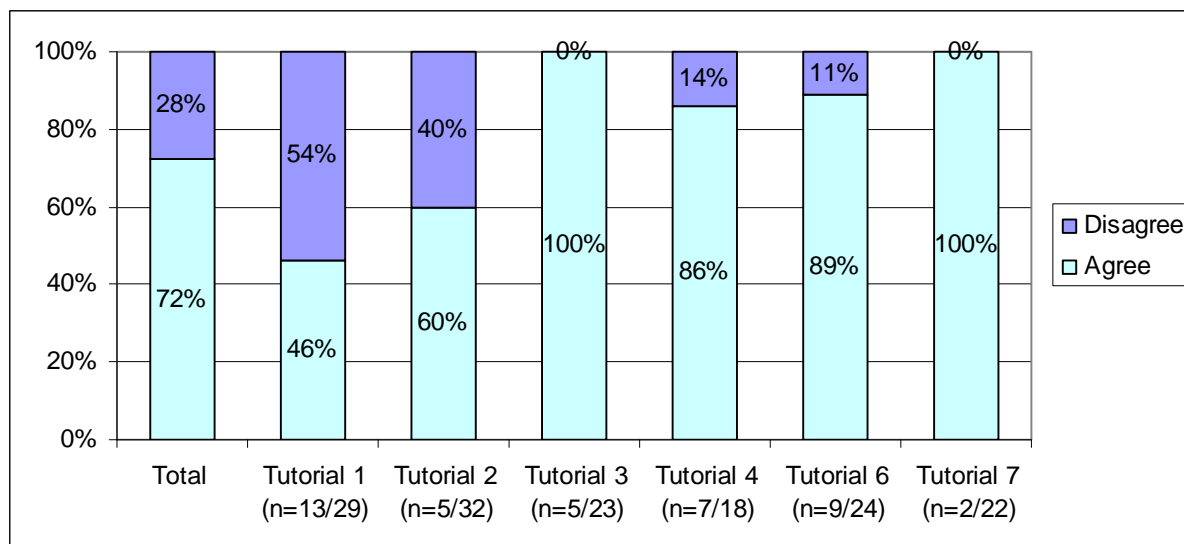
**Figure 2: Student survey responses to Question 1 by tutorial group (Having to write responses to the 'Feedback Catalyst Questions' facilitated my thinking about my behaviour and the behaviour of my team in producing the Requirements Report.)**



**Figure 3: Student survey responses to Question 2 by tutorial group (Having prepared written responses to the ‘Feedback Catalyst Questions’ meant that I had more meaningful conversation and provided more effective feedback than would have most likely been the case without the prior reflection that occurred as a result of completing the feedback questions)**



**Figure 4: Student survey responses to Question 3 by tutorial group (The ‘Feedback Catalyst Questions’ helped my team explore ways to improve our team processes and behaviours for the next group assessment task)**



**Figure 5: Student survey responses to Question 4 by tutorial group( If you are repeating this subject: I think that using the ‘Feedback Catalyst Questions’ made the feedback sessions more productive than those I undertook previously in the subject)**

### Tutor Surveys

The tutor surveys contained the questions listed in Table 2. The responses to these questions are listed in Table 3 for each tutor.

**Table 2: Survey questions for tutors - Questions 1, 2 & 3 for all tutors; Questions 4, 5 & 6 for tutors who have previously tutored in Design Fundamentals**

Question 1	In my opinion having to write responses to the ‘Feedback Catalyst Questions’ facilitated students’ thinking about their behaviour and the behaviour of their team in producing their Requirements Specification
Question 2	The fact that students had already prepared written responses to the ‘Feedback Catalyst Questions’ meant my conversations with the students and/or the feedback I was able to provide was more effective and meaningful than would have probably been the case without their prior reflection.
Question 3	The ‘Feedback Catalyst Questions’ helped my groups/teams explore ways to improve their group/team processes and behaviours for the next group assessment task.
Question 4	I think that using the ‘Feedback Catalyst Questions’ made it easier for me to be effective in facilitating the feedback sessions compared to previous semesters
Question 5	I think that the guidance provided by the ‘Feedback Catalyst Questions’ helped me to be better prepared and/or understand what was required from me as a tutor facilitating the feedback sessions
Question 6	I think that using the ‘Feedback Catalyst Questions’ made the feedback sessions more productive than those I facilitated in previous semesters in Design Fundamentals.

**Table 3: Tutor responses to survey questions - Questions 1, 2 & 3 for all tutors; Questions 4, 5 & 6 for tutors who have previously tutored in Design Fundamentals**

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Question 1	0	0	Tutors 1, 3 & 8	Tutors 2 & 11	Tutors 5 & 7	Tutor 6
Question 2	0	0	0	Tutors 1,2,3 & 8	Tutors 5 & 7	Tutor 6
Question 3	0	Tutor 1 & 3	0	Tutors 2 & 8	Tutors 5,6,7 & 11	0
Question 4	0	Tutor 1 & 3	0	Tutors 2 & 8	Tutor 5	Tutor 6
Question 5	0	Tutor 1 & 3	Tutor 2	Tutor 8	Tutors 5 & 6	0
Question 6	0	Tutor 1 & 3	Tutor 8	Tutor 2	Tutor 5	Tutor 6

## Discussion

Figure 1 shows that the student responses to the four questions listed in Table 1 were overwhelmingly positive, indicating that for most students the feedback catalyst questions helped them both to reflect on their own behaviour (83%) and improve the outcomes (more meaningful conversations and effective feedback 79%) from the group activity. Significantly 72% of students repeating the course (ie they had previously failed Design Fundamentals) agreed that the feedback catalyst questions made their feedback sessions 'more productive'.

The results in Table 3 show that tutors 2, 5, 6, 7 and 11 agreed with Question 1 that the feedback catalyst questions helped students reflect on their behaviour; only two tutors slightly disagreed with this statement (the tutor for tutorials 1 and 3 was the same person). All tutors agreed with Question 2 that their conversations with the students and/or feedback was more effective and meaningful as a result of students' prior reflection from using the catalyst questions. Furthermore, all tutors, except for the tutor of tutorials 1 and 3, agreed that the feedback catalyst questions helped the students in their tutorial "explore ways to improve their group/team processes and behaviours for the next group assessment task".

Questions 4, 5 and 6 were for tutors who had previously tutored in Design Fundamentals. From their responses it can be seen that all repeating tutors found that the catalyst questions made it easier for them to be effective in facilitating the feedback sessions compared to previous semesters, except for the tutor of tutorials 1 and 3. The responses to Question 5 show that this tutor and tutor 2 did not find that the catalyst questions helped them to understand their role any better than in previous semesters. However, tutor 2, along with tutors 5 & 6 agreed that the catalyst questions made the feedback sessions more productive than in previous semesters. The results show that tutor 8, an experienced Design Fundamentals tutor, was generally neutral varying between slightly disagree to slightly agree for all responses. Conversely tutor 2, an experienced engineer, reported that the catalyst questions did not help them to better facilitate the feedback sessions, was positive about their use and the effect they had on students.

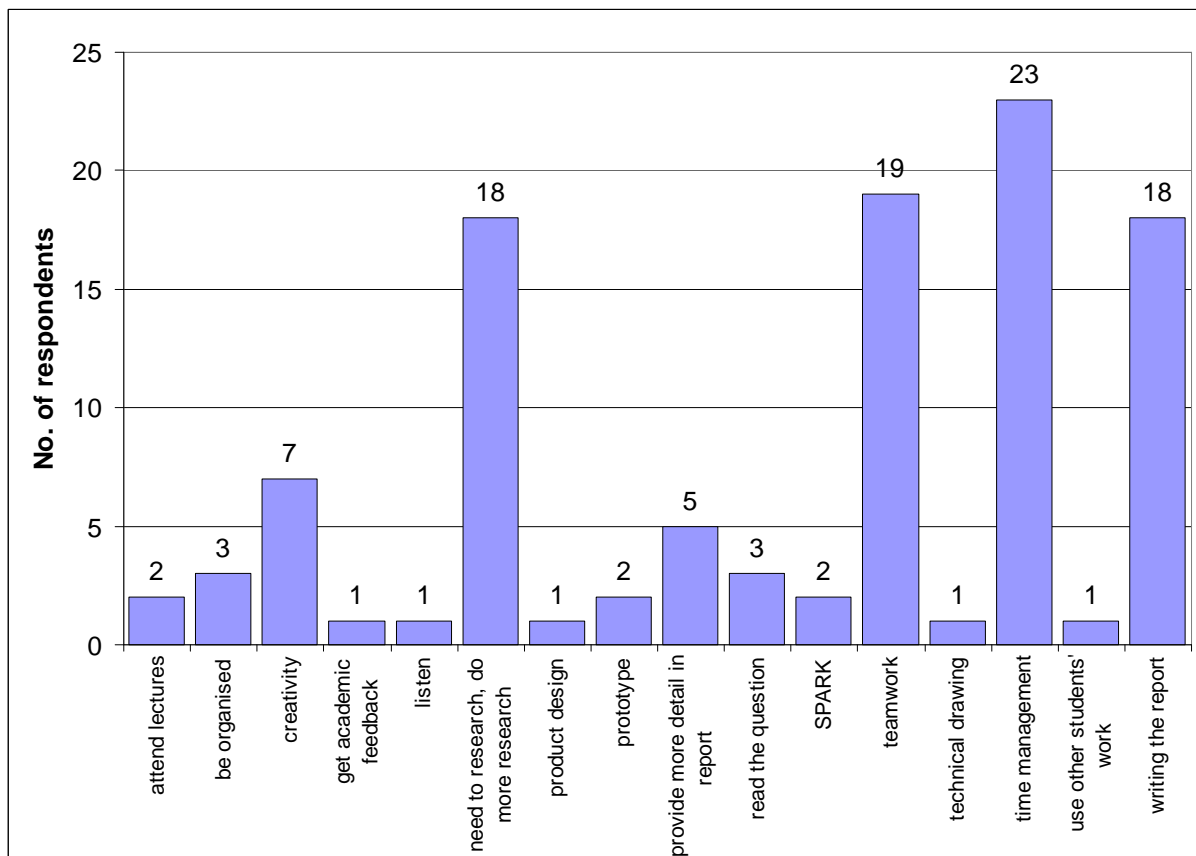
Analysis of the results for individual tutorial classes shows that in responding to Questions 1 to 3, students in Tutorials 1 and 3 typically had a much higher negative (disagree) response when compared to the other tutorials. Significantly these tutorials were run by the same tutor and not surprisingly, of all the tutors they were the least positive in their perceived benefit of using the feedback catalyst questions. This tutor disagreed with all tutor survey questions except Question 2 which asks tutors to respond to the statement: "The fact that students had already prepared written responses to the 'Feedback Catalyst Questions' meant my conversations with the students and/or the feedback I was able to provide was more effective and meaningful than would have probably been the case without their prior reflection". While this tutor was experienced and may have felt that the questions did not assist them in facilitating their feedback sessions, the fact that students in their class also found the questions to be less effective cannot be overlooked. Conversely, Tutor 6 gave the most favourable response of all the tutors to the tutor survey questions, and the students in their tutorial were also the most positive (reporting the highest percentage of 'agree' to the student survey questions) about the feedback catalyst questions. While this tutor had significant 'life' experience, they had only previously tutored this subject once before Autumn semester 2009. The other tutors all

had different degrees of experience with tutor 7 being the least experienced having no previous tutorial experience in any subject. The results suggest that from the student point of view the experience of the tutor was not a significant factor in contributing to how useful they found the feedback catalyst questions. However, not surprisingly the engagement with and support of the tutor for the process had a larger impact on the benefit they received.

The results of this research enable us to draw the following conclusions:

- i. Students were overwhelmingly positive that the feedback catalyst questions, by helping them better prepare for their feedback sessions, enabled them to have more meaningful conversations with, and provide more effective feedback to, their team peers.
- ii. While more experienced and confident tutors were more neutral in their response as to whether the feedback catalyst questions assisted them in improving their preparation and facilitation of the feedback sessions, the benefit gained by the students was related to how much the tutors engaged with the process.
- iii. Inexperienced tutors found the feedback catalyst questions not only assisted them in the preparation and facilitation of their feedback sessions but also that their use made the feedback sessions more productive.

Although not a planned part of this study, student responses to the catalyst questions were collected from tutorial groups 1 and 3 after the feedback session on the Requirements Specification report. Figure 6 shows the list of areas where students in these tutorials reported they believed they could improve their performance. This Figure also indicates the frequency (cohort 58) with which students reported each issue. The issue most often identified by students as an area where they could improve their performance was time management, this was closely followed by teamwork skills, doing more research, and actually writing the report. It is interesting to note that two students wrote that attending lectures would help them to be more effective. It was also encouraging that only one student reported that the most effective way to improve their performance was to acquire an exemplar report from one of the previous semester’s students. The authors hope that this is a result of students being more reflective and an increasing confidence in their ability to judge and assess their own work.



**Figure 6: Student responses to the feedback catalyst question: “Some specific things I could do to be even more effective in the future include:”**

Preliminary coding of student responses to the feedback catalyst questions in NVivo also included examples of skills/behaviours that they learnt from other members of their team. The most identified skill that students learnt from other members of their team was interpersonal skills such as “politeness”, “friendliness”, “patience” and a “sense of responsibility”. These skills are mainly developed through practice and interaction rather than primarily through instruction. Communication skills were also mentioned often, with students reporting that they now recognised the “importance of communication” and “I learnt to communicate in a more professional manner”. Some of these communication skills relate to technology with one student learning “some good Microsoft Word tricks” and several students commenting that they learnt to have “email discussions, where we all discuss one aspect without actually being in one place”. In terms of technical content students identified writing unambiguous requirement statements and test plans as skills they learnt from someone else in their group.

The value in studying the student responses to the catalyst questions is it helps us to identify what students are learning and what they perceive as their learning gaps or skills that they need to improve, rather than what **we** think they are learning or need to improve. It was through this mechanism that we identified time management as the most common problem concerning students. Typically assignments are ‘just-in-time’ managed tasks (a bit like conference papers). In future semesters we intend to include self and peer assessment criteria and/or catalyst questions which specifically address and focus students attention on this issue. We believe this will encourage student reflection and discussion of strategies to help them become more effective in managing their time.

The diversity of activities that students identified as likely to help them be more effective in the future demonstrates the effectiveness of the catalyst questions and facilitated feedback sessions in guiding students to reflect on their learning processes and hence initiate a change in their behaviour. The fact that the majority of students reported that the catalyst questions helped them to be better prepared and hence gain more benefit from these feedback processes is in itself a positive outcome. Having students come to the discussion prepared increases the opportunity for feedback on the range of identified issues and reduces the risk of the conversation being dominated by any one single issue.. The authors are of the opinion that without the facilitated feedback sessions many students would not have taken the time to reflect on their learning process, missing the opportunity to improve their learning and address any identified weaknesses or gaps in their abilities and or knowledge. In the absence of feedback sessions student reflection is often limited to focusing on the mark they received and its perceived fairness (backward looking) rather than improving their performance and learning in future activities.

## Conclusions

In previous research the authors have found many students don’t think they have anything to discuss during feedback sessions because their group functioned reasonably well, and hence they miss the opportunity for reflection and to receive feedback to complete the learning cycle. In this paper we report testing whether the use of ‘feedback catalyst questions’ to initiate reflection and facilitate learning oriented effective feedback would increase the benefits students received from feedback sessions. We found that the pre-feedback self reflection exercise improved learning and student engagement with greater than 80% of students reporting multiple benefits. The effectiveness of facilitated feedback sessions was demonstrated by students reporting a diverse range of activities they could use to be more effective in the future. The authors are of the opinion that without the catalyst questions many students would think they had nothing to discuss in the facilitated feedback sessions and not take the opportunity to improve their learning and address any identified weaknesses. The fact that students overwhelmingly reported that the catalyst questions helped them to be better prepared and hence gain more benefit from these feedback processes is in itself a significant positive result.

In addition, while the less experienced and confident tutors reported the most benefit from the exercise in assisting them to facilitate their feedback sessions, not surprisingly the degree of benefit enjoyed by their students was more related to the tutor’s engagement with the exercise rather than the tutor’s teaching experience. This suggests that while good processes are important there is no substitute for enthusiastic and engaging tutorial staff.

## References

- Boud D., and Falchikov, N. (2007) *Rethinking Assessment in Higher Education Learning for the Longer Term*. Routledge.
- Dominck P., Demel J., Lawbaugh W., Freuler R., Kinzel G. & Fromm E. (2001) *Tools and Tactics of Design*. USA: John Wiley & Sons, Inc.
- Falchikov, N., and Goldfinch, J. (2000). Student Peer Assessment in Higher Education: A Meta-Analysis Comparing Peer and Teacher Marks. *Review of Educational Research*, 70(3), 287-322.
- Freeman M. and McKenzie J. (2002), SPARK, A Confidential Web-Based Template for Self and Peer Assessment of Student Teamwork: Benefits of Evaluating across Different Subjects, *British Journal of Educational Technology*, vol. 33, pp. 551-69.
- Johnston L and Miles L, (2004). Assessing contributions to group assignments, *Assessment and Evaluation in Higher Education*, vol. 29, pp. 751, 2004.
- Mello J. A. (1993). Improving individual member accountability in small work group settings, *Journal of Management Education*, vol. 17(2), pp. 253-259, 1993.
- Michaelsen L, Knight A., Fink L., (2004) *Team-based Learning – A transformative use of small groups in college teaching*. USA, Sylus Publishing.
- Ramsden P., (2003) *Learning to Teach in Higher Education*, 2nd ed. London: Routledge,
- Somervell H. (1993). Issues in assessment, enterprise and higher education: the case for self-, peer and collaborative assessment, *Assessment & Evaluation in Higher Education*, vol. 18, pp. 221–233, 1993.
- Willey, K. and Freeman M. (2006a), Completing the learning cycle: The role of formative feedback when using self and peer assessment to improve teamwork and engagement. *Proceedings of the 17th Annual Conference of the Australasian Association for Engineering Education*, 10 -13th December 2006, Auckland, New Zealand.
- Willey K, and Freeman M. (2006b), “Improving teamwork and engagement: the case for self and peer assessment”, *Australasian Journal of Engineering Education*. Online publication 2006-02 <http://www.aeee.com.au/journal/2006/willey0106.pdf>
- Willey, K and Gardner, A. (2008a) Using Self Assessment to Integrate Graduate Attribute Development with Discipline Content Delivery. *Proceedings of the 36th Annual Conference of the European Association of Engineering Education (SEFI) 2-5 July*, Aalborg, Denmark.
- Willey K., and Gardner A., (2008b) Using self and peer assessment for professional and team skill development: do well functioning teams experience the benefits? *Proceedings of the ATN Assessment Conference – Engaging Students in Assessment*, November, 2008. South Australia.
- Willey K., and Gardner A., (2008c) Improvements in the self and peer assessment tool SPARK: Do they improve learning outcomes? *Proceedings of the ATN Assessment Conference – Engaging Students in Assessment*, November, 2008. South Australia.
- Willey, K. (2010) SPARK<sup>PLUS</sup> website <http://www.spark.uts.edu.au> [last accessed 24th April 2010]

## Acknowledgements

The initial redevelopment of SPARK was a joint research project between the University of Technology, Sydney and the University of Sydney. The main developers were Dr Keith Willey UTS, A/Prof Mark Freeman USyd (also chief architect and developer of the original SPARK) and Mr Darrall Thompson UTS. We would also like to acknowledge the contribution of Mr Mike Howard who has continued to work with the authors in developing SPARK<sup>PLUS</sup>.

Copyright © 2010 Gardner & Willey: The authors assign to the EE2010 organisers and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to the Engineering Subject Centre to publish this document in full on the World Wide Web (prime sites and mirrors) on flash memory drive and in printed form within the EE2010 conference proceedings. Any other usage is prohibited without the express permission of the authors.