RDP 124

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

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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^{PLUS} (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^{PLUS} 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^{PLUS} 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^{PLUS} 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.

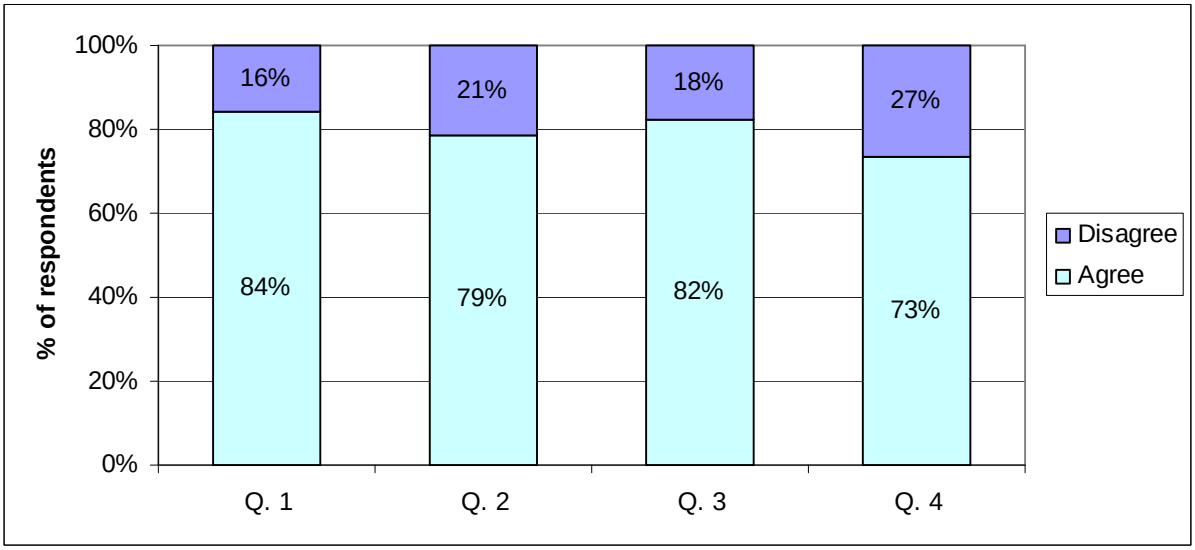

Figure 1: The response of all students to the four survey Likert format questions

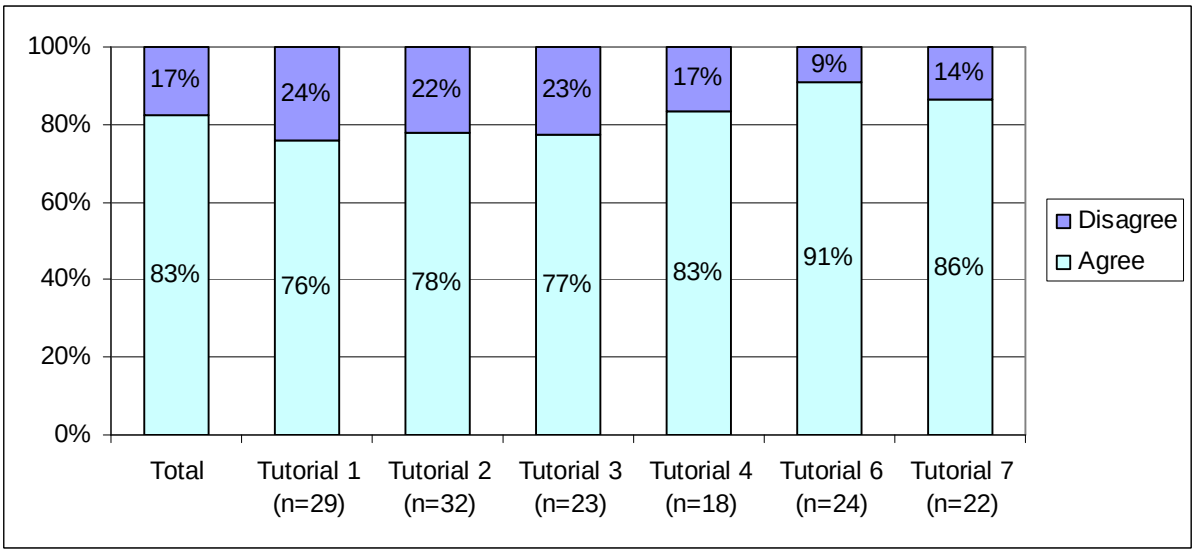

Figure 2: Student survey responses to Question 1 by tutorial group (Having to write responses to the 'Feedback Catalyst Questions' facilitated my thinking about my behaviour and the behaviour of my team in producing the Requirements Report.)

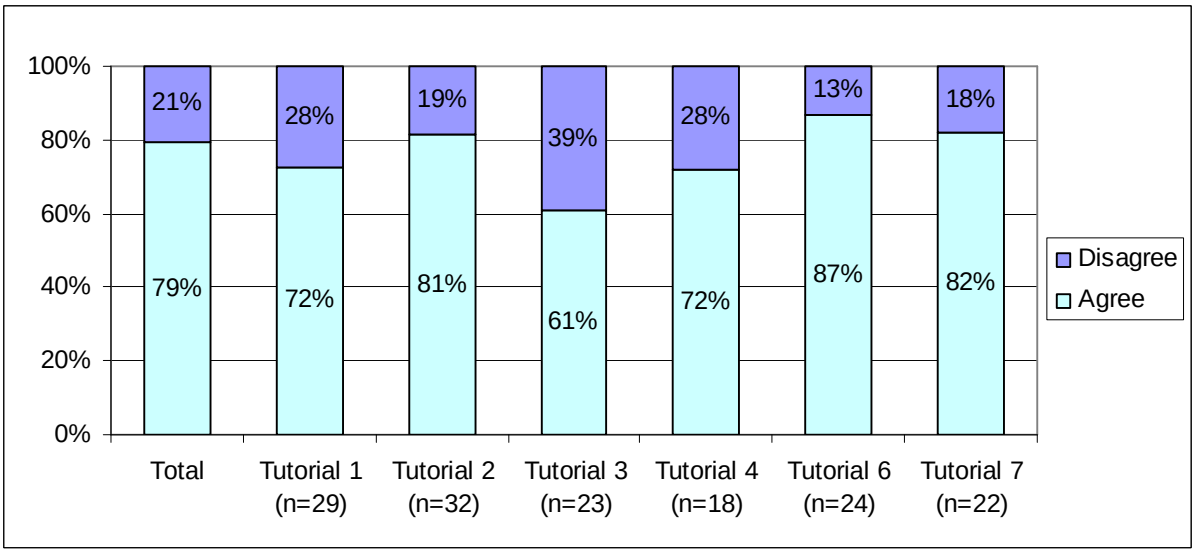

Figure 3: Student survey responses to Question 2 by tutorial group (Having prepared written responses to the 'Feedback Catalyst Questions' meant that I had more meaningful conversation and provided more effective feedback than would have most likely been the case without the prior reflection that occurred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

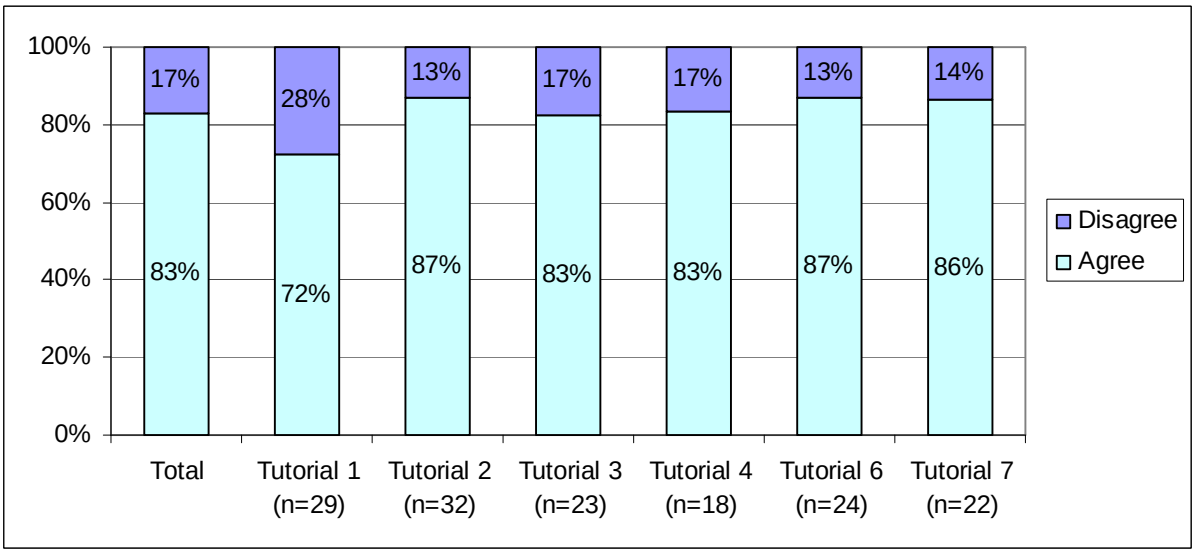

Figure 4: Student survey responses to Question 3 by tutorial group (The 'Feedback Catalyst Questions' helped my team explore ways to improve our team processes and behaviours for the next group assessment task)

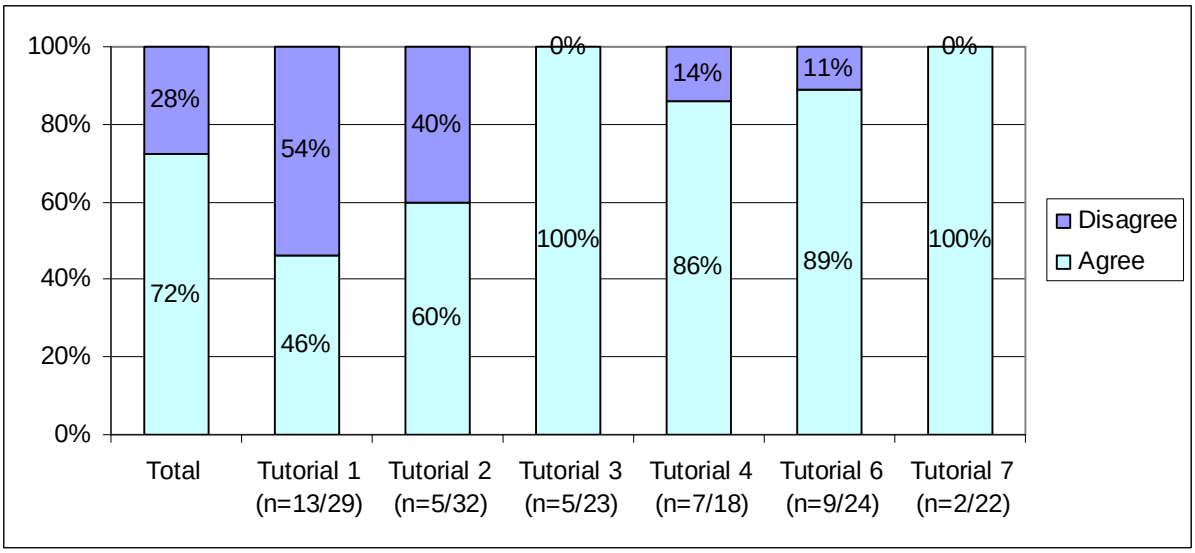

Figure 5: Student survey responses to Question 4 by tutorial group(If you are repeating this subject: I think that using the 'Feedback Catalyst Questions' made the feedback sessions more productive than those I undertook previously in the subject)

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.

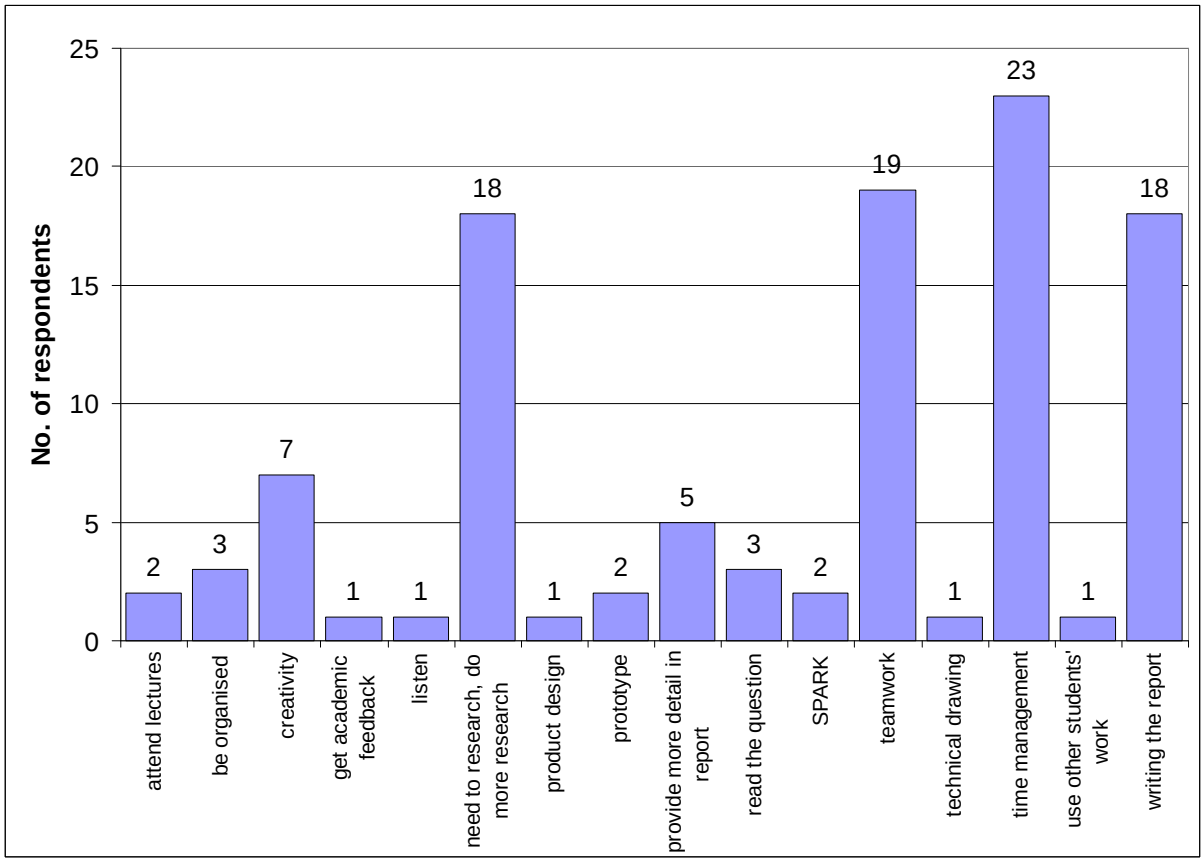

Figure 6: Student responses to the feedback catalyst question: "Some specific things I could do to be even more effective in the future include:"

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.

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Full submissions should follow the style guidelines and format template available from http://www.ee2010.info/call-for-participation.asp

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Day 1: TUESDAY am		
10.00 - 11.00	Conference Registration	
11.00 - 11.15	Welcome address – Vice-Chancellor Prof. Julia King, Aston University	
11.15 – 11.50	Keynote address: Euan Lindsay Program Leader - Mechatronic Engineering, Department of Mechanical Engineering, Curtin University of Technology, Perth	
12.00 - 13.00 - Parallel 1 - First Year Students and Progression 1		
P5	The wheel has already been invented: facilitating students' use of existing mechanics resources	Thomas Goldfinch and Anne Gardner
P47	Progression of Engineering Students who attended a Pre-sessional Residential Summer School	Glynis Perkin, Sarah Bamforth and Carol Robinson
P105	A Validated Approach to Teaching Engineering Mathematics	Charles McCartan, Paul Hermon and Geoff Cunningham
12.00 - 13.00 - Parallel 2 - Learning Technologies 1		
P111	Improving Engagement and Learning Experience for Students using Lab-in-a-Box Concept	Diane Rossiter, Stephen Beck, Martine Delbauve, Marian Hogg and Geoffrey Priestman
P99	Use of e-learning to encourage engagement and depth of understanding across engineering science and design within the first year of an engineering degree	Kay Bond, Carol Eastwick, John Prentice, Mike Johnson and Arthur Jones
P54	Online assessment is not always quick and easy	Elizabeth Smith
12.00 - 13.00 - Parallel 3 - Supporting Diversity		
P35	Engineering the curriculum	Bland Tomkinson
P104	Analysis of a diagnostic and support programme for improved learning of Civil Engineering students	Peter Mills and Panagiotis Georgakis
P77	Can a story deepen comprehension, engagement and analysis skills of undergraduate engineering strategy by students with diverse backgrounds?	Christopher J. M. Smith, Owen Richards, Nerea Etura Luque and Elizabeth Miles
13.00		

– 14.00	Lunch	
Day 1: TUESDAY pm		
14.00 - 15.30 - Workshop 1		
W42	Bridge to Schools	Norman Seward, Gareth Williams and Keith Jones
14.00 - 15.30 - Workshop 2		
W20	The role of manual simulation/games in learning	Laurence Legg
14.00 - 15.30 - Workshop 3		
W82	Enquiry Based Learning, what's that then? How to inspire your students, develop their professional	Ivan Moore and Mike Bramhall
14.00 - 15.30	Engineering Education Research SIG	
15.30 – 16.00	Afternoon Tea	
16.00 - 17.30 - Parallel 4 - Enhancing the student learning experience		
P18	Non-traditional subjects taught to engineers: a case study of teaching anatomy	Tom Joyce
P62	Motivation of engineering students – considerations for programme design	Sarah Green and Erik Meyer
P48	Perceptions and their Influences on Approaches to Learning	Jenna Tudor and Roger Penlington
P43	Academic Success of First Year Engineering Students: Emotional Intelligence a Predictor?	Frankie Stewart and Colin Chisholm
16.00 - 17.30 - Parallel 5 - Learning Technologies 2		
P61	Improving the Learning Experience for the First Year Engineering Students using Technology Enabled Activity Led Learning	Jayaraman Ramachandran and Olivier Haas
P94	Laboratory focussed learning of core electronic engineering concepts in the first year of an honours degree programme	Kate Sugden, David Webb and Richard Reeves
P38	Flowchart driven Robot to promote Educational Development (FRED)	Anthony Bateson, Nathan Brown and Antony Wilkinson
P22	Problem Solving and Creativity in Engineering: conclusions of a three year project involving Reusable Learning Objects and Robots	Jonathan Adams, Stefan Kaczmarczyk, Phil Picton and Peter Demian
16.00 - 17.30 - Parallel 6 - Research Discussion Papers		
P78	Engaging and retaining distance learning engineering students: the development of effective engineering communities	Kath Clay

P124	Does pre-feedback self reflection improve student engagement, learning outcomes and tutor facilitation of group feedback sessions?	Anne Gardner and Keith Willey
P75	The Impact of a Large Cohort of Chinese Students on the Delivery of an Engineering Degree in the UK	Junxia Hou, Catherine Montgomery, Peter Harrington and Liz McDowell.
19.30	Drinks Reception	
20.15	Conference Dinner – Aston University	

Day 2: WEDNESDAY am		
7.30 - 8.30 am	Conference Run	
9.15 - 9.50	Keynote Address – Richard Earp Education and Skills Manager, National Grid	
10.00 - 11.00 - Parallel 1 - Design and Activity based learning		
P11	An activity led learning experience for first year electronic engineers	Nigel Poole, Robert Jinks, Stephen Bate, Mark Oliver and Christopher Bland
P96	Group Design-Build-Test Projects as the Core of an Integrated Curriculum in Product Design and Development	Paul Hermon, Charles McCartan and Geoff Cunningham
P117	The proof of the pudding is in the eating	John Swagten, Faas Moonen and Ivette Wennekes
10.00 - 11.00 - Parallel 2 - Project Based Learning		
P118	Internationalization of Undergraduate Group Projects	Martin Pitt
P109	Making projects work: a review of transferable best practice approaches to engineering project-based learning in the UK	Ruth Graham and Edward Crawley
P40	Service-learning experiences: a way forward in teaching engineering students?	Elena Rodriguez-Falcon and Alaster Yoxall
10.00 - 11.00 - Parallel 3 - Education for Sustainable Development		
P39	Approaches to the embedding of sustainability into the engineering curriculum – where are we now, and how do engineers become global?	Simon Steiner and Roger Penlington
P84	Developing awareness about sustainable development in Civil Engineering studies	Barbara Karleusa, Aleksandra Deluka-Tibljas, Suzana Ilic and Nevena Dragicevic
P64	An engineering design course: developments over five years emphasising hands-on learning and topics of sustainability	Tom Joyce, Iain Evans and Bill Pallan
11.00 – 11.30	Coffee	
11.30 - 13.00 - Parallel 4 - Meeting the needs of Industry		

P55	Meeting the needs of industry: the drivers for change in engineering education	Carol Arlett, Fiona Lamb, Richard Dales, Liz Willis and Emma Hurdle
P74	Major Hazards Management – a finishing module for undergraduate engineers on how to manage risk	Graham Schleyer, Nicholas Underwood, Graham Dalzell and Nicola Stacey
P19	The career aspirations of a cohort of Associate Degree students: Implications for the engineering educators and the profession	David Dowling
P13	Engineering your Workplace Advantage: Personal Development Planning resources for undergraduate engineers	Andrea Duncan
11.30 - 13.00 - Parallel 5 - Research Discussion Papers		
P101	A Quantitative Approach to Identifying Threshold Concepts in Engineering Education	Martin Holloway, Esat Alpay and Anthony Bull
P45	Towards developing a coherant notation in dynamics that will aid learners	Peter Vivian
P41	"How do we encourage the next generation of engineers?"	Susan Forder, Kieran McDonald, Gary Drabble and Jeremy Twyman
11.30 - 13.00 - Parallel 6 - The Engineering Subject Centre Teaching Award Finalists 2010		
13.00 – 14.00	Lunch	
Day 2: WEDNESDAY pm		
14.00 - 15.30 - Workshop 1		
W71	Getting girls into engineering and women onto engineering degree courses	Heather Hawthorne and Rachel Epson
14.00 - 15.30 - Workshop 2		
W69	A Global Dimension for Engineering Education	Petter Matthews and Caroline Baillie
14.00 - 15.30 - Workshop 3		
W33	Inspirational teaching and learning: Developing and encouraging autonomous student learning	Michael Bramhall, Keith Radley and Ivan Moore
14.00 - 15.30	Network Meeting – NTFS and Teaching Awards Finalists	
15.30 – 16.00	Afternoon Tea	
16.00 - 17.30 - Parallel 7 - Work-Based Learning		
P36	Credit bearing work-based learning: learning from other's practice	Sarah Bamforth, Debra Lilley, Caroline Lowery and Adam Crawford

P70	Work-based MSc Professional Engineering: an evaluation so far	Deborah Seddon and Deborah Lock
P122	An effective practice in preparing students for workplace	Fakhteh Soltani-Tafreshi, David Twigg and John Dickens
P57	Development of a work-based learning MSc course which incorporates the development and demonstration of professional engineering competence standards	Bill Glew and Ted Elsworth
16.00 - 17.30 - Parallel 8 - Recruiting and Retaining Engineering Students		
P60	Discourses, identities and learning: implications for the training of student ambassadors in engineering	Clare Gartland, Heather Hawthorne and Claire McLoughlin
P97	Inspiring young people to engage in engineering education: The Aston University Engineering Academy Birmingham	Alison Halstead, Mike Jerome and Anne Wheeler
P15	Engaging Future Engineers: Pedagogy, Policy & Practice	Robin Clark and Jane Andrews
P66	The effects of gender on the success of a cohort of engineering students	Lorelle Burton and David Dowling
16.00 - 17.30 - Parallel 9 - Assessment and Feedback 1		
P29	Designing an Ideal Assessment Scheme for Dual Mode Delivery	Vasantha Aravinthan
P26	Motivating students to learn through good and helpful coursework feedback	Shun Ha Sylvia Wong
P53	Developing a Departmental Strategy to Improve Student Feedback	Jane Horner
P52	Addressing the Learners' Needs for Specific and Constructive Feedback	Jenna Tudor and Noel Perera
19.00 - 23.30	Gala Dinner, National Motorcycle Museum 18.45 Coaches depart 19.15 Drinks Reception and museum tour 20.15 The Engineering Subject Centre Teaching Award Presentations, supported by the Engineering Council. 20.30 Dinner 22.30 Coaches depart for Aston	

Day 3: THURSDAY am		
09.15 - 09.50	Keynote address by Jack Lohman Vice Provost and Professor, Georgia Institute of Technology, Atlanta, Georgia	
10.00 - 11.00 - Parallel 1 - Engineering Education – Perspectives from Students		
P103	Reflections on an integrated team approach to the creation of new e-learning resources for first year engineering students	Holly Fox, David Whitley, Julian Tenney and Carol Eastwick
P125	A Student's Perspective on the Effectiveness of Personality and Learning Tools in Engineering Education	David Whitman and Dorothy Missingham
	Engineering Humour: A student's perspective on the	Amelia Greig, Dorothy Missingham and

P127	effective use of humour in engineering education	Colin Kestell
10.00 - 11.00 - Parallel 2 - Learning Technologies 3		
P25	Promoting collaborative learning in engineering management education through the use of wikis	Fiona Saunders, Mark Jasper and Peter Whitton
P28	Impact of using Moodle as an educational management tool to enhance learning for on campus and external mode electrical students at USQ	Ronald Sharma
P81	How do we build sustainable e-learning tools to meet the needs of engineering educators?	Nicola Wilkinson, Adam Crawford and Fiona Lamb
10.00 - 11.00 - Parallel 3 - Developing and motivating students		
P128	Leadership in a technological environment	Gary Codner
P8	Supporting development of independent learning skills	John Anthony Rossiter and Linda Gray
P23	Understanding Motivation in Large Groups of Engineering and Computing Students	Roberto Ramirez Iniguez and Ursula Canton
11.00 – 11.30	Coffee	
11.30 - 13.00 - Parallel 4 - Assessment and Feedback 2		
P9	Using audio to support student learning	John Rossiter, Anne Nortcliffe and Andrew Middleton
P90	Challenges of developing engineering students&apos: writing through peer assessment	Teresa McConlogue, Jens-Dominik Mueller and Julia Shelton
P31	Effectiveness of self-assessment quizzes as a learning tool	Vasantha Aravinthan and Thiru Aravinthan
11.30 - 13.00 - Parallel 5 - First Year Students and Progression 2		
P12	The impact of task value upon stress and workload levels of first year engineering students	Euan Lindsay
P121	Six-week introductory programme of activity led learning to improve student engagement and retention	Paul Green
P46	Who leaves and who stays? Retention and attrition in Engineering Education	Elizabeth Godfrey, Tim Aubrey and Robin King
P14	Evaluation of initiatives related to engagement and retention of first year mechanical engineering students at two Russell Group Universities	Tom Joyce and Elena Rodriguez-Falcon
11.30 - 13.00 - Parallel 6 - Research Discussion Papers		
P34	Who chooses the "E" in STEM?	Darryl N. Williams and Michael A. Gottfriend
P7	Engineering – young people want to be informed	E. Ekevall, E. L. Hayward, G. Hayward, J. Magill, E. Spencer, G. MacBride, C. Bryce and B. Stimpson

P16	'Catching Them Young': Inspiring Future Engineers, An Exploratory Study	Robin Clark and Jane Andrews
11.30 - 13.00	WebPA SIG	
13.00 – 14.00	Lunch	
Day 3: THURSDAY pm		
14.00 - 15.30 - Workshop 1		
W129	OERP Workshop; Methods & Processes	Alex Fenlon and Rob Pearce
14.00 - 15.30 - Workshop 2		
W17	Building Bridges for Future Sustainability? Breaching the research-teaching nexus in Engineering Education	Robin Clark and Jane Andrews
14.00 - 15.30 - Workshop 3		
W93	Climbing up the Slippery Slope - helping first year engineers to master the peaks and troughs of differentiation	Glynis Perkin and Jan Robertson
14.00 - 15.30	WebPA SIG	
15.30 – 16.00	Afternoon Tea and Closing address	

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