

## Changing Student's Perceptions of Self and Peer Assessment.

**Keith Willey**

Faculty of Engineering & IT, University of Technology, Sydney. Sydney, Australia  
Keith.Willey@uts.edu.au

**Anne Gardner**

Faculty of Engineering & IT, University of Technology, Sydney. Sydney, Australia  
Anne.Gardner@uts.edu.au.

**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 found a significant number of students perceive self and peer assessment to be 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. We assumed that these perceptions were enforced by the fact that the main use of self and peer assessment was to moderate marks and provide feedback to individuals on their contribution to team tasks. We hypothesised that these perceptions would change if students were provided with opportunities to use self and peer assessment for different purposes. In this paper we report testing this hypothesis by using self and peer assessment multiple times a semester to not only assess team contributions but to assess individual student assignments and in benchmarking exercises. Our aim was to test whether this approach would assist students to gain more benefit from self and peer assessment processes while simultaneously breaking down their narrow focus on fairness.*

### Introduction

It is often 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). Despite this work and the research of others, many students and academics perceive self and peer assessment to be 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 to assess individual contributions to a team project even with an emphasis on the provision of feedback

to promote learning, many students in well functioning teams often 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, 2008b). We hypothesised that students' focus on the use of self and peer assessment as a tool to facilitate fairness would change and hence the benefits they receive increase, if they were provided with opportunities to experience its use for different purposes.

In this paper we report testing this hypothesis by providing opportunities for students to use self and peer assessment for different purposes within a single semester. Self and peer assessment facilitated using the online tool SPARK<sup>PLUS</sup> (Willey & Gardner, 2008c) was used to not only assess team contributions but to assess individual student assignments and in benchmarking exercises.

## SPARK<sup>PLUS</sup>

SPARK<sup>PLUS</sup> is a tool for facilitating the use of self and peer assessment. It has the capacity to not only assess a student's contributions to a team project, but also allows students to self and peer assess individual work and improve their judgment through benchmarking exercises (Willey & Gardner, 2008a; Willey & Gardner, 2008c).

SPARK<sup>PLUS</sup> assists students to make their self and peer assessments by requiring them to rate each other over multiple criteria (Figure 1). The program has the capacity to produce three assessment factors:

- The Self and Peer Assessment (SPA) factor is a weighting factor determined by both the self and peer rating of a student's contribution. It is typically used to change a team mark for an assessment task into an individual mark as shown below:

$$\text{Individual mark} = \text{team mark} * \text{Individual's SPA}$$

- The Self Assessment to Peer Assessment (SAPA) factor. This is the ratio of a student's own rating of themselves compared to the average rating of their contribution by their peers. The SAPA factor has strong feedback value for development of critical reflection and evaluation skills eg, a SAPA factor greater than 1 means that a student has rated their own performance higher than the average rating they receive from their peers and vice versa.
- The third factor is a percentage mark, the calculation of which depends on the type of task that has been selected (e.g. benchmarking exercise or marking individual work).

SPARK<sup>Plus</sup> also allows students to provide anonymous written feedback to their peers and provides a number of options for graphically reporting results.

## Design Fundamentals

Design Fundamentals is a Stage 3 compulsory core subject within all Engineering Degrees at the University of Technology, Sydney. The subject's typical cohort is approximately 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>) is used four times during the semester.

**SPARK<sup>PLUS</sup>**  
Self & Peer Assessment Resource Kit  
1.0.0 RC22 Feedback

Hi [Redacted]  
Due date: 13 Mar 2009 11:55pm  
Instructor: Anne Gardner  
Period: Post-Assessment  
WELL DONE!

Key for rating:  
Z = Unsatisfactory  
P = Pass  
C = Credit  
D = Distinction  
HD = High Distinction

[View formula used](#)

SELECT SUBJECT: 48240 Design Fundamentals Autumn 2009  
SELECT TASK: Individual Project Concept  
GROUP NAME: Group [Redacted]

**CONCEPT**  
1. Level of innovation associated with the concept idea. How good is the idea.  
2. Could the product realistically be manufactured and sold at the specified price using kW and its workforce and would it meet the sales target of 6000 customers over 3 years.

SPA: 1 SPA: 0.88  
Z P C D HD  
Z P C D HD

**WRITTEN COMPONENT**  
1. How well the document identifies the product's expected use, features, target market, expected selling price and how the product addresses the other scenario requirements.

SPA: 1 SPA: 0.94  
Z P C D HD

**FREEHAND SKETCHES**  
1. Quality of the freehand sketch or sketches to enable customer to understand and / or visualise the product concept.

SPA: 0.92 SPA: 0.95  
Z P C D HD

Overall: Z P C D HD  
Overall: SPA: 0.98  
SAPA: 0.91  
Mark: 73%

Feedback from your peers  
The concept is a good idea and it is possible to sell 6000 in 3 years. I thought the written component was very good, but I think that the drawing needed improvements, more detail when it came to the 'device' and more detail as to the aesthetics of the hall as what colour, logos

Self rating  
Your average rating from peers  
[View my radar diagram](#)

[Logout](#)

**Figure 1: A student's SPARK<sup>PLUS</sup> results screen for a task where each student had to self assess their own submission and peer assess the individual submissions of their team peers.**

## Method

Self and Peer assessment was integrated into four distinct peer learning assessment tasks that when combined form a major design project. The tasks were as follows:

**Individual Project Concept:** Students use SPARK<sup>PLUS</sup> to assess their own and seven of their peers' submissions reporting each student's individual project concept chosen to meet a number of specified criteria. In the next tutorial the group of eight students debate the merits of each individual submission (discussing their individual strengths and weaknesses) and collectively place them in order from best to worst awarding a mark for each one. Students then receive the results from SPARK<sup>PLUS</sup> and are asked to reflect on any differences between results produced from their individual assessments (SPARK<sup>PLUS</sup>) and those produced collectively in their peer group. The tutor marks the best report from each group (as identified by the students) and determines marks for the other reports using the weighting produced by SPARK<sup>PLUS</sup>.

The peer learning groups are divided into two groups of four students. Each group works together to complete the three remaining stages of the project.

**Benchmarking Exercise:** Students are provided with a Sample Requirement Specification produced by a student group from a previous semester. After discussing the marking criteria each student has to assess the report using SPARK<sup>PLUS</sup>. In their next tutorial each group of four students discuss their individual marking of the report and re-mark it collectively against the criteria. Students then re-combine into their peer learning groups (two groups of four students) and discuss their group's marking of the report, reflecting on any differences and collectively re-mark it. Tutors then discuss how they marked the report. After the tutorial students may log on to SPARK<sup>PLUS</sup> and compare their individual marking to the tutor's marking of the report for each individual criterion and read the tutor's comments.

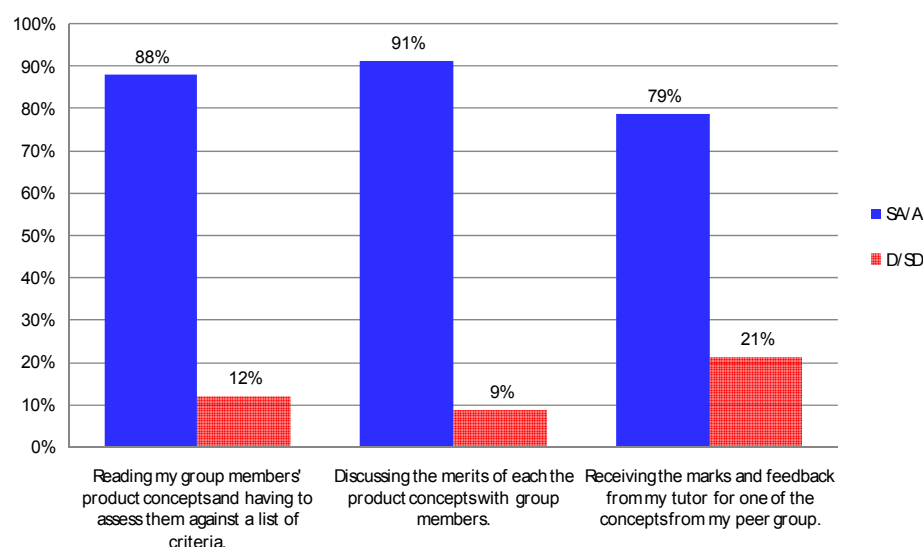
In addition, SPARK<sup>PLUS</sup> produces a weighted mark related to how close the student's individual assessment was to the academic's assessment.

**Requirement Specification:** each group of students produces a requirement specification for their design project. Students use SPARK<sup>PLUS</sup> to rate their own and their team peers' contribution to this stage of the project. The SPARK<sup>PLUS</sup> SPA factors are used to produce individual marks by moderating the mark for the group's submission. In the next tutorial the group's individual results are distributed to all group members and discussed. Groups are guided through a feedback process. This process begins with self evaluation where students share with their group what they have learnt or discovered about their strengths, weaknesses or performance from the exercise. Students are encouraged to identify how they could improve their own performance and in what way they would approach the task differently if they had to do it again. Students are asked to suggest how others in their group may have approached their tasks differently to achieve a better group result, how aspects of their behaviour affected the team and the benefits of changing that behaviour, and to reflect on how team peers could have learnt more from the process. The in-class discussion concludes by teams agreeing how to improve their overall team and individual performance for the remaining parts of the project and /or in future group work opportunities.

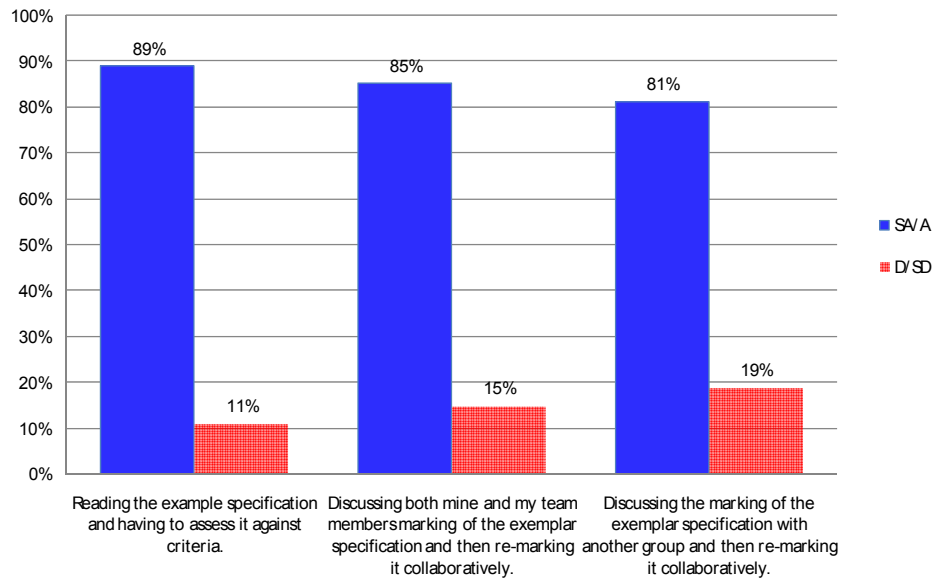
**Project Report, Oral Presentation and Prototype Demonstration:** each group of students produce a project report, make an oral presentation and present their prototype design. Students again use SPARK<sup>PLUS</sup> to rate their own and their team peers contribution to this stage of the project. This is followed by the same feedback process and discussion as previously described.

In the last semester of 2008 three subject surveys were conducted to assess the effectiveness of the self and peer assessment processes used in the subject to both facilitate high level learning outcomes and change students' focus on it being a tool to facilitate fairness. The questions were a mixture of free response and 4 point Likert format. All students undertaking the project (eligible cohort 255) were required to participate in the self and peer assessment exercises. The first two surveys (Individual Project Concept and Benchmarking) were conducted in tutorial classes resulting in 209 and 201 students responding respectively. The post subject survey was much longer (60 questions), conducted online, and was completed by 89 students from an eligible cohort 255 (35%).

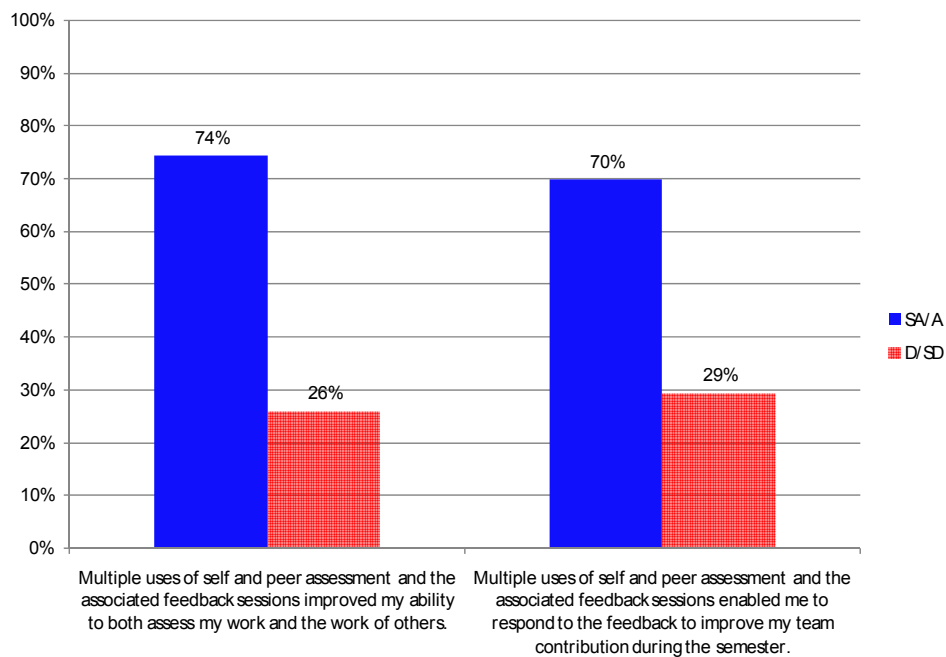
## Results



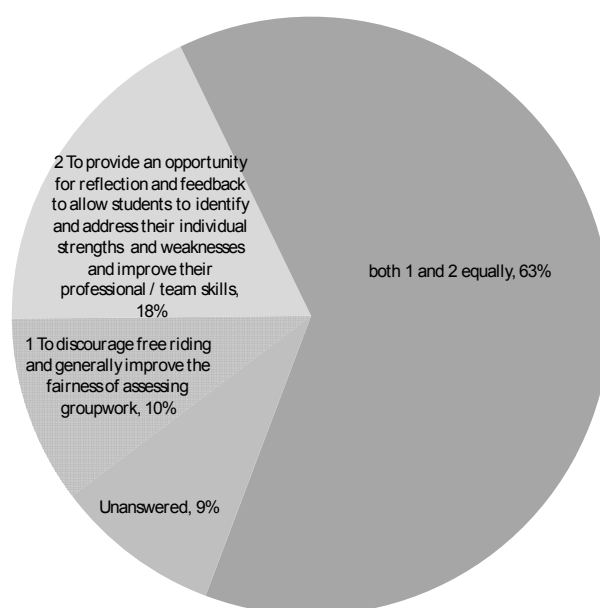
**Figure 2: Student survey results for Self and Peer Assessment Marking of Individual Project Concepts in response to the question “My ability to choose a product concept and write a concept document to meet a list of requirements increased as a result of:”**



**Figure 3: Student survey results for Self and Peer Assessment Benchmarking Exercise in response to the question “My ability to write a quality requirement specification has increased as a result of:”**



**Figure 4a: Results from Post Subject Survey**



**Figure 4b: Results from Post Subject Survey in response to the question “The main reason self and peer assessment is used in Design Fundamentals is”:**

## Discussion

Figures 2 - 4 present the survey results relevant to this paper. The ‘Strongly Agree’ and ‘Agree’ responses were combined to give an aggregate result, as were the ‘Strongly Disagree’ and ‘Disagree’ responses. The percentage of any unanswered questions are generally not shown but can be calculated by subtracting the provided results from 100%.

The results (Figure 2 and 3) show that the majority of students (ranging from 79% to 91%) felt that all aspects of the group marking of individual submissions and the benchmarking exercises improved their ability to meet the prescribed learning outcomes. While there were some complaints from students that it took too long to complete all the parts of these exercises, generally speaking most students were positive in line with the survey free response comments below:

**Peer review:** “Allows you to see what people think of your work and how you can improve” [sic].

**Benchmarking:** “Reviewing and marking a previous piece of work helped to understand the theory from the lectures. Knowing we need to write a Requirements Specification that is unambiguous is easy enough to know, but WHAT that actually looks like, and doing it is hard. Getting a picture of what NOT to do first, helps developing that knowledge” [sic].

The results also indicate that the use of self and peer assessment made a significant contribution to students’ learning outcomes for the exercises used to determine a team member’s contribution to the last two stages of the project. Figure 4a shows that 74 % of respondents agreed that its use improved their ability to make assessments with 70% agreeing that it helped them improve their team contribution. In addition to these results there were many positive free response comments a sample of which are reported below:

“Peer assessment facilitated by SPARK improved my group work experience by facilitating and giving me peer feedback with regards to the contributions by the team. It gave all team members an opportunity to give fair and constructive feedback (mostly) to each other, thus

*improving the performance in projects throughout the semester, and most likely in later subjects also."*

*"Improved my group work experience as SPARK enables a fairer assessment, I was driven to participate and function with my team as a group. It gave me the opportunity to see my effort (by my SPA rating) and also to know what other team members thought about my performance from feedback received. I really enjoyed working in a group for this subject and I think SPARK had a big influence in that" [sic].*

*"I strongly believe SPARK should be used for every group work assessment in university and has the potential to be utilised in the workforce."*

In regard to our second aim of changing students' perception about the use of self and peer assessment Figure 4b shows only 10% of respondents reported that they believed that the main reason for using it in the subject was to discourage free riding and generally improve fairness of assessing groupwork. Nearly double or 18% indicated that it was being used mainly to provide opportunities for reflection and feedback, to identify and address individual strengths and weaknesses and improve professional and team skills. The majority (63%) of respondents responded that the main reason for using self and assessment in the subject was a combination of these two objectives. That is, both to improve fairness and initiate reflection and feedback to improve learning.

After discussing these results and genuinely reflecting on the way we discuss the use of self and peer assessment with the student cohort, the results are not surprising. We do tell students that self and peer assessment is used for both purposes within the subject. We inform students that while fairness and catching free riders is an outcome of using self and peer assessment, it is almost a by-product and happens as a matter of course. We articulate that our real aim and indeed most of the related instruction and tutorial time is spent on facilitating feedback to improve learning. However, it is the last two tasks where students assess each other's contribution to team tasks that have the greatest potential to affect their final grade. Ramsden concluded that *'from our students point of view, assessment always defines the actual curriculum'* (Ramsden, 2003, p. 182, emphasis added) so it follows that if we want to change students' perceptions in regard to self and peer assessment we should also change the assessment distribution to support this aim. This observation is supported by the following free response comment provided by a student in relation to the use of self and peer assessment within the subject:

*"Feedback couldn't be used to improve mistakes and consequently improve the assessment marks. I feel its a big waste when this is the case as the feedback isn't taken as serious as it should be as you cant use it to improve your marks. Even though it helps you to learn, as it doesn't show through in the assessment marks which is ultimately the students number 1 aim, ...."(sic).*

While the results demonstrate that the use of self and peer assessment for different purposes within a single subject was extremely beneficial to student learning, a significant number of students (10%) still believed that it was mainly used to facilitate fairness. At the time of writing this paper we are examining the survey results in more detail and plan to invite students to join focus groups to help us redesign our assessment tasks to more effectively change students' perceptions. In particular we plan to provide students with an opportunity to use the feedback they receive from the self and peer assessment exercises to improve their submissions before they are graded. However, careful consideration is required in designing such activities as they have a tendency to significantly increase marking workload for academics (especially in large classes) and over assessment for students. Maybe our real challenge is to get students to value what they have learnt, not just what is assessed.

## Conclusion

The results show that the multiple use of self and peer assessment processes for different purposes was successful in assisting students to achieve the desired learning outcomes. The majority of respondents, greater than 69%, reported that its use improved their ability to meet the reported learning outcomes. However, despite the different applications of self and peer assessment within the subject, a significant number of students (10%) still believed that the main reason for its use was to facilitate fairness. We are currently in the process of working with students to redesign our assessment tasks to more effectively change students' perceptions. In particular we are looking to provide students with an opportunity to use the feedback they receive from the self and peer assessment exercises to improve their submissions before they are graded. However, caution is required as this process has a tendency to significantly increase marking workload for academics and over assessment for students.

## References

- Boud D., and Falchikov, N. (2007) *Rethinking Assessment in Higher Education Learning for the Longer Term*. Routledge.
- 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 36<sup>th</sup> Annual Conference of the European Association of Engineering Education (SEFI)* 2-5 July, Aalborg, Denmark.
- Willey K., 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., 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.

## 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 © 2009 Keith Willey & Anne Gardner: The authors assign to the REES 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 REES to publish this document in full on the World Wide Web (prime sites and mirrors) on CD-ROM and in printed form within the REES 2009 conference proceedings. Any other usage is prohibited without the express permission of the authors.