Iterative learning: Self and peer assessment of group work

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Group work is commonly used to help students learn and develop team skills. However, many students report having poor experiences of assessable group work. While self and peer assessment can be used to reward student contributions more equitably in assessment contexts, careful design and support issues need addressing to ensure its success. This paper reports a social constructivist approach to assessing and improving group work. First, the literature linking summative and formative assessment with group work is reviewed. The importance of formative assessment in developing shared understandings between academics and students of the assessment criteria, in particular through self and peer ratings on criteria related to their group work contributions, is discussed. Second, findings from a pilot study, employing an online tool (SPARK) to enable collection and aggregation of self and peer ratings, are presented. Two cycles of data analysis, interpretation and reflections generate what we term iterative learning. Third, when carefully integrated, SPARK facilitates not only individual and groups of students to learn but also affords opportunities for academics to learn and refine assessment that increases student engagement. This paper will be useful for academics and academic developers seeking to support improved group work learning and assessment activities.

Keywords: formative assessment, group work, team work, self and peer assessment, SPARK, free riding, team skills, feedback

Introduction

This paper presents a social constructivist approach to assessing and improving group work. Students construct and re-construct meanings, acquire values, and develop skills and shared understandings about both group processes and the substantive subject by engaging participatively in a community of practice, oriented around assessable tasks in a subject. When supportive self and peer assessment processes are integrated, students can refine their ability to make judgements about what constitutes good team work, at the same time as developing their understanding of the assessment and grading processes. These skills are ones that students will use in the workplace as supervisors, managers and team members. As such, these are generic skills which universities are increasingly committed to developing in their students.

In a constructivist approach to assessing, the academic engages with students around the assessment criteria, the assessment processes and their feedback (Rust, O'Donovan & Price, 2005). This engagement assists in developing student understandings of the assessment criteria and their application. It also assists them in developing their understanding of the academic's tacit and explicit knowledge of applying assessment criteria and standards. Furthermore, when formative assessment is incorporated to developmental or practice activities prior to a summative assessment, the potential for improving subsequent summative assessment is enhanced. In addition to the student learning, the reflexive design processes used by staff in the evaluation of the teaching and assessment processes themselves are also a site of potential learning. By developing an iterative, discipline-based learning process in which the academic participates in a meta-analysis with academic developers, the feedback gained through self and peer assessment from students can be recursively employed in the second iteration of the subject. This emergent process drawing upon action research principles opens a space for the integration of formative and summative assessment as well as genuine participation and learning for students, academics and academic developers.

This paper reports on the learning related to self and peer assessment of group work from two iterations of a postgraduate subject. The first iteration (Freeman, Hutchinson & Treleaven, 2006) describes a deliberate strategy to focus on improving group work through attention to formative feedback to teams

undertaking major group work assessment. The strategy employed a range of activities built around a computer-mediated assessment tool, Self and Peer Assessment Resource Kit (SPARK). SPARK is an online program for enabling confidential self and peer ratings to be aggregated and used for summative and formative assessment. When carefully integrated into the learning process, SPARK enables not only individual and groups of students to learn but also affords opportunities for academics to learn and improve the assessment process. The paper therefore presents both the first iteration of the course and feedback and the changes leading to the second iteration incorporated for the subsequent semester. The work involved a threefold collaboration between the lecturer, an experienced SPARK developer and an academic learning and teaching adviser.

The impetus for the initial study came from the need to improve group work experiences in the Faculty of Economics and Business at the University of Sydney. In the 2005 SCEQ (Student Course Evaluation Questionnaire), 10% of students' qualitative comments on the best aspect of their Course experience related to group work. Yet, another 10% of the qualitative comments identified group work as the aspect most in need of improvement. The Faculty therefore undertook to develop significant website resources to help students and staff engage in improved group work practices, as well as a commitment to support colleagues embed good practices identified in those website resources. The group work assessment study reported here is one of a number of such good practices being trialled.

In the paper that follows, the literature linking assessment with group work is first discussed. The pilot study of SPARK as a tool for formative assessment in the study site is then outlined. The analysis and interpretation of student responses to a questionnaire following their formative use of SPARK are then discussed. The iterative processes of further interpreting these results in the light of students' summative results are then reviewed including the changes proposed for subsequent use of SPARK as a more effective tool for formative feedback, supporting the development of teamwork and moderating the summative group assessment. Finally, the implications for formative use of this online self and peer assessment tool are drawn out, underscoring how assessment can support social learning processes in the classroom and reduce some of the problems of group work for staff and students.

Linking assessment and group work

This section reviews the literature linking assessment and group work. First, the links in the literature between summative assessment and group work are presented; second, the links between formative assessment and group work are considered; and third, the importance of integrating formative and summative approaches in improving group work is discussed.

Summative assessment and group work

The critical role of assessment in motivating learning is undeniable. In fact, Ramsden (2003, p.182) argues that 'from our students' point of view, assessment always defines the actual curriculum'. Summative assessment is most obvious because it is used to grade students. Students often fear its outcome because errors equate to punishment thus arousing 'passion, resistance and subterfuge' (Biggs, 2003, p.142–143). The problem with summative assessments is often exacerbated with group projects. These are commonly incorporated in economics and business units as assessments to motivate students to develop valuable generic graduate attributes such as teamwork and interpersonal communication skills. While there is the added benefit of reducing the number of assessments academics need to mark, there are real challenges particularly with group work primarily designed to be completed out-of-class. Fink (2004) notes two problems, namely the existence of free-riders and students dividing up the work to submit something akin to a collection of individual assignments. This temptation is not surprising given the challenges of finding mutually convenient meeting times to complete group work projects because Australian students are typically commuters and also because more students are working more hours in paid employment. Fink (2004) argues that a divide-and-conquer strategy defeats the purpose of the group work task. One solution to these problems is to engage students in self and peer assessment. As well as facilitating teamwork, Hanrahan and Isaacs (2001) argue self and peer assessment is an effective method for promoting the development of life long learning since students can be involved in judging their own or their peers' performance using criteria much as they need to be able to do in the workplace. To optimise engagement Biggs (2003) recommends actively involving students in the development of the assessment criteria and the decisions about what constitutes good evidence. Leach, Neutze and Zepke

(2001) note that non-conventional assessment can provide students with an empowered role. Learning how others evaluate is also useful and peer assessment of groups by groups (e.g. Freeman, 1995) is one way to extend peer assessment opportunities to learn critical evaluation skills.

As well as involving students in marking individual or group assignments via self and peer assessment, Goldfinch and Raeside (1990) and Goldfinch (1994) document a process of applying self and peer assessment to adjust summative teamwork marks into individual summative marks for team members by considering team processes. Self and peer assessment is a particularly useful method to award marks because it is difficult for the academic to know what individual contribution has occurred outside the class time. Peers or co-workers have more information than the academic. Individual contributions to achieving the group outcome might be in terms of the tasks to complete a team assignment or simply relate to implicit processes that improve group outcomes such as being inclusive and encouraging of others. Contributions are rated by all students in a team. These are then used to calculate an adjustment factor for each individual member that can be applied to the group mark. Interestingly, Lejk and Wyvill (2001) find more able students assessing their own contribution as lower than their less able peers.

Freeman and McKenzie (2002) extend Goldfinch's approach by developing a confidential online template to collect self and peer ratings and to calculate an adjustment factor for every student. A factor of 1.1 on a group mark of 20 out of 25 would result in a final individual mark of 22. SPARK has three main benefits according to Freeman and McKenzie (2002): it solves most of the administrative issues associated with paper-based approaches (i.e. data collection and analysis); students can confidentially make their ratings, and re-rate if necessary, online at any time during a rating period following completion of the project or project stage; multiple assessment criteria relating to different team tasks can easily be used to minimize the likelihood of the most recent task dominating perceptions of who did the work and how well it was done. Furthermore, it can be utilized for both formative and summative self and peer assessment.

Formative assessment and group work

Formative assessment is perhaps more critical to learning because students inevitably develop misconceptions in the process of the construction of their knowledge. Biggs (2003) argues that because making such errors does not have a grading impact students feel freer to make them. Instruction, correction and feedback should then assist students (and teachers) to identify what needs to be the focus of their future efforts.

Developing the right environment to facilitate students feeling free to make mistakes, and learn from them, is an important design issue and an important implementation issue. Academics can optimise the formative learning opportunities by maximising students' awareness of their own knowledge construction. This is achieved by learning activities which can be teacher-directed (e.g. feedback from a tutor in a tutorial), peer-directed (e.g. peer evaluation and feedback of a class presentation) or self-directed (e.g. optional use of self-paced online quizzes with auto-marked feedback). Self and peer assessment, discussed above in a summative context, can also be used for formative assessment purposes. Implementation shortcomings however, such as sarcastic comments or ratings from a peer about a team member's mistakes, can easily undo any clever tool or activity designed to encourage reflection, formative feedback and learning.

Other group work design features may facilitate a climate of formative feedback and reciprocal peer learning. According to Michaelsen, Knight and Fink (2004), permanent teams are more likely to nurture productive interaction and feedback patterns over time. There is also evidence that

> membership diversity initially inhibits both group processes and performance, but becomes a clear asset when members have worked together over an extended period of time.
> (Watson, Kumar & Michaelsen 1993, in Michaelsen, 2002, p.30)

Integrating formative and summative approaches

Formative feedback is optimally provided to students prior to their summative assessment (Higgins, Hartley and Skelton, 2002). Drawing upon the pioneering work of Scriven (1967) and Sadler (1989) in the area of formative assessment, Taras (2002; 2005) demonstrates the importance of integrating

formative and summative approaches. The practice of detaching and prioritising summative approaches, while common in current assessment processes, is linked to poorer learning outcomes (Taras, 2002). Taras (2002; 2003) has shown the crucial importance of providing feedback to students prior to any summative assessment. She emphasises that

> any appearance of a grade or mark from peers or tutor, before students have had time to interiorise feedback on their work, interferes with the assimilation and understanding of this feedback. (Taras 2002, p.507)

She has therefore developed systems of peer and self assessment that integrate this approach into her assessment practices. Her practice has two distinctive features: firstly, minimal (i.e. according to the learning needs of the student), integrated tutor feedback, and secondly, tutor feedback and student self assessment takes place before students are provided with a grade (2002; p.549). Further she advocates that 'processes, aims and products should all support each other and fit logically into a coherent interactive framework' (Taras, 2006, p.373). This is consistent with Biggs' (2003) notion of constructive alignment also taken up recently by Boud and Falchikow (2006), whereby

> the components in the teaching system, particularly the methods used and the assessment tasks are closely aligned to the learning activities assumed in the intended outcomes (p.400).

Other recent studies have emphasised the importance of social learning within group and teamwork processes and the important formative learning that occurs in such communities of practice (Lave & Wenger, 1991). Rust, O'Donovan and Price (2005) explore the application of theories of social construction to assessment processes. Since students often do not understand what is expected of them in assessments (O'Donovan, Price & Rust, 2001), they emphasise that

> one of the key issues underlying problems with assessment practice is that to truly understand the requirements of the assessment process – and the standards being applied – requires tacit as well as explicit knowledge (p.232).

They suggest that addressing problems of current practice and enhancing student learning experiences are possible by adopting a social constructivist view of learning drawing upon Vygotsky (1962; 1978) and Bruner (1986; 1990). This view proposes that

> knowledge is shaped and evolves through increasing participation within different communities of practice (Rust et al., 2005, p.232).

Further, adopting a constructivist approach underlines the importance of developing students' capacity to make distinctions and judgments both about their own work and the work of others which is related to the capacity to make language based distinctions in a community of practice (Taylor, 1985; Tsoukas & Vladimirou, 2001). Boud and Falchikow (2006) discuss the need for students to learn to be assessors of both their own and others' learning. This skill involves developing the capacity to make distinctions and judgements which are centrally important to knowledgeable practice (Tsoukas & Vladimirou, 2001). Boud and Falchinow (2006) also suggest that this type of knowledge is acquired in professional practice through socialisation and action processes. Such knowledge is always, therefore, socially constructed, so learning occurs within communities of practice (Lave & Wenger, 1991). These ideas are particularly consistent with group work and the formative processes that occur within them.

Pilot study: Self and peer assessment of group work

This study is based on a pilot application of self and peer assessment of group work contributions using SPARK in a core subject in a Master of Business program in Semester 1 2006. The course had an enrolment of 41 students. Each group of approximately five students was required to complete three assessments: two oral seminar presentations (with submission of visual aids) and a written assignment.

These group assessments provided the context for students to demonstrate that they met the University and Faculty learning goals to:

- communicate effectively in verbal, written and group contexts to a professional standard
- lead and participate in teams (including members from diverse cultural backgrounds)
- manage, persuade and influence others.

The aim in setting group seminar presentations as well as an assignment was to provide students with the opportunity to get to know each other's personalities, strengths and weaknesses and to develop inclusive processes required for team work, prior to completing their assignment. The two seminar presentations were relatively straightforward tasks involving, first, the use of a conceptual framework to answer a question about a business case, and, second, a critical evaluation of a single journal article. They could be completed satisfactorily with relatively low levels of teamwork. However, the assignment, due at the end of semester, was a major project in which students were required to analyse the sources of a specific business' competitive advantage. With great scope for differences in research, interpretation and approach, and no obvious way of sub-dividing the task into five separate components, this type of project could not be completed well without highly developed teamwork.

This assessment structure has been used in previous semesters. However, the challenge has been for the academic to provide effective and practical guidance on how to develop team skills, especially with large cohorts, and to provide strong incentives for students to learn to work as a team. SPARK was piloted to provide such incentives since students knew that peer assessment would moderate the group mark. By automating the self and peer assessment data collection and collation, SPARK also made it feasible to employ multiple assessment criteria covering both team processes and team tasks. It also had the administrative advantage of automatically generating the factors that are used to moderate group marks (e.g. an individual self and peer assessment (SPA) factor of 1.1 results in a mark of 22 when applied to a team mark of 20). Since it is an online tool, students could readily learn about it themselves and complete ratings more certain of confidentially. The fact that SPARK is well-researched gave further weight to its adoption. As a formative assessment tool, SPARK offered the opportunity of providing feedback on students' evaluations of group work contributions. By generating a ratio of self to peer evaluation (SAPA), students can gauge how their own perceptions of their individual contribution differ or are similar to peers' perceptions of their contribution (e.g. a 1.1 SAPA indicates an over inflated self view).

The academic, in consultation with the academic learning and teaching adviser, drafted preliminary criteria for evaluating group work contributions for each group assessment task. These distinguished between team processes and team tasks. They were then discussed with students who suggested several modifications and simplifications. In particular, students created an additional criterion distinguishing between the effort expended in research and the quality achieved in synthesising and interpreting the research material for the group assignment. The final criteria for group contribution to the seminar presentations are shown below on the SPARK rating screen (Figure 1). Since all criteria are weighted equally by SPARK in calculating the adjustment factors, the use of three team process criteria and three task criteria shows the importance placed on teamwork.
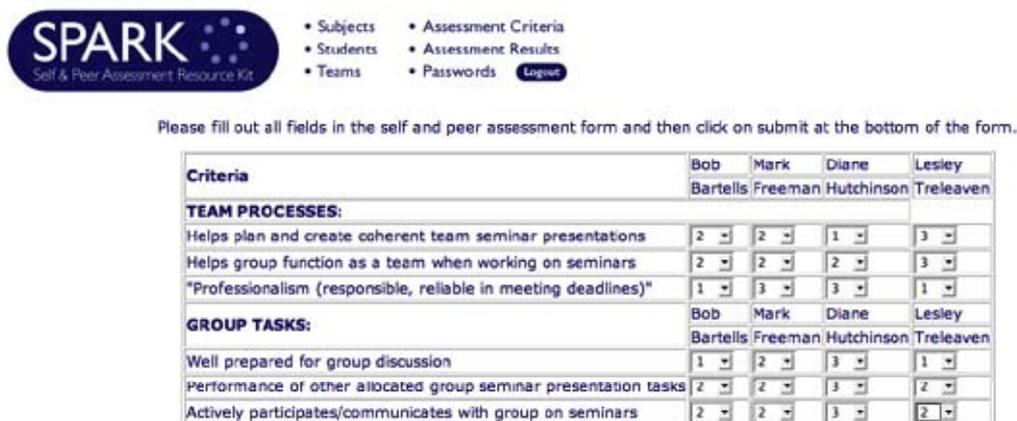

Figure 1: SPARK screenshot showing assessment criteria

Using these criteria, students carried out a formative self and peer evaluation of group work contributions to their seminar presentation in week 7. The results were discussed in the following class. At the end of semester, the students carried out summative self and peer evaluations for both the seminar presentations and the assignment, generating the weighting factors which were used to moderate group assessment marks. This process was evaluated through a confidential student questionnaire carried out prior to the summative ratings.

A first iteration: Interpreting questionnaire data

Findings from the first iteration of formative feedback are presented below. These findings are the first of two cycles of interpretation from which different understandings have been developed to inform the second iteration of the course. It is these cycles of data, analysis, interpretation and reflection that enable what we have termed here iterative learning. In the first cycle, questionnaire data related to the formative use of SPARK was examined independently of the academic, for reasons of participant confidentiality. In the second cycle, once student results in the course had been finalised and submitted, all data from the course, the summative peer and self ratings of their group work, the summative student results, and the qualitative comments on the formative study questionnaire were read by the academic. Reflections were discussed with the SPARK developer and learning and teaching developer. This reading brought the academic's contextualised knowledge of the substantive course, the teams' performances and the academic's reflections on the implementation of SPARK and her teaching.

The role of group work in the course

All 34 students who responded to the question on the role of group work indicated that they understood the value of group work. Their understandings were consistent with the Faculty's stated generic graduate attributes, especially in communication ('learning how to function as a team', 'improve group work skills' and 'group decision making', 'cope with possible conflict') research and inquiry ('exchanging ideas', 'learn more from each through idea sharing') and diversity ('producing a superior presentation by utilising team strengths', 'learning how to deal with different people').

The formative evaluation process

Students seem to have taken the formative self and peer assessment of group contributions seriously – of the 39 students who responded, 77% stated that they thought about their ratings before they logged on to enter their online individual and group ratings. While 13% responses were neutral, only 10% indicated that they did not consider how they would evaluate individual and group performance prior to logging on. Further, only 13% students logged back on to change their initial ratings, and two of these students were among those who reported that they had not thought about the ratings before initially logging on.

Students were asked what they learnt from engaging in the formative assessment process. Their answers provide evidence that the formative classroom feedback process helped give some students confidence in the peer assessment process ('I could see the group valued my contribution') while others pointed to the fact that the process showed them how their marks would be adjusted for their contribution, thus providing a reminder that contribution mattered. At the least, the formative feedback left these students better informed about the use of SPARK and its role as a self and peer tool, thereby reinforcing its incentive effects.

Noteworthy is the learning that some students gained from peer feedback. The Johari Window (Luft, 1970), which has been used extensively in group work, provides a useful framework to examine student reflections on their learning. Their comments in the questionnaire demonstrate that they gained insight into aspects of their performance that were not known previously to them ('Some were oblivious to their contribution', 'sometimes you punish yourself, sometimes the others show you that you are not as good as you think') and also insight into the awareness of others ('some thought they worked harder than perceived by their peers', 'the evaluation of my contribution to the group was rated higher by the group than myself'). Other students came to understand that performance ratings 'can depend on factors such as confidence and self deprecation.'

Students were also asked whether they changed their approach to their group work as a result of the formative assessment process. Only a relatively small number (9/39) indicated that they made changes. In the qualitative explanation of these answers, two students said they began to explain their contributions more clearly to their group, leading to better summative peer evaluation of contributions. Perhaps the most telling comment was about learning to give prospective rather than retrospective feedback to group members: 'group giving direct suggestions rather than use computer evaluations'. Some pointed to individual changes in their group work contributions such as trying 'to get into the activity greater (with much better result)', or working more towards the criteria. Another indicated that their group began to 'contact each other more frequently …making work more effective'. This suggests that, for at least some students, the formative evaluation did help to reinforce the need to work co-operatively.

However, for others the formative assessment was more an opportunity to 'confirm what I was doing was on the right track'. Such comments as 'good to monitor the contribution of each group members' and 'signals for each group member to contribute their best' were indicative of the way in which knowing that self and peer assessment would be conducted discouraged 'free riders' while emphasising that 'Group mark will be adjusted in relation to your contribution'. In this sense, SPARK can be seen as providing a pre-emptive approach to free riding.

A second iteration: Contextualising the data reading and interpretation

The second cycle of data analysis and interpretation enabled the broader role of SPARK to be examined from the perspective of its impact on the whole of the course. While students had not used SPARK for summative evaluations at the time of the questionnaire, they had been aware from the outset that it would be employed to moderate marks as well as provide formative feedback. They were asked in the questionnaire whether they thought the use of SPARK had helped their groups function better. 42% students responding to this question agreed the use of SPARK had supported their group work with comments such as 'reduces free riding', 'knowing that our group would self assess motivated individuals and group', 'members realise their responsibilities and roles', and 'it assists to improve marks'.

However, more students (48%) responded neutrally. This apparently ambivalent response can arguably be attributed to the pre-emptive effects of the use of a transparent peer and self assessment process to moderate group marks, especially when its role was reinforced through the formative assessment process. Interestingly, one student commented that SPARK 'doesn't help students much but the teacher gains understanding of student collaboration.' To some extent this comment is valid: SPARK enabled the academic to gain knowledge of the teamwork which would not otherwise have been available.

The academic's view was that more groups in this course developed good teamwork skills than had been the case in previous semesters, and the overall quality of the group assessments improved, with fewer assessments that were simply a collation of individual contributions. She also saw less evidence of free-riding. It is difficult to be precise about the impact of SPARK on this result but the academic sees it as part of a supportive process for group work which includes appropriate assessment design and constructive guidance. SPARK's role was that it allowed multiple criteria to be readily assessed, sending clear signals about the importance of teamwork, reinforced by the transparency of SPARK as an assessment tool, and the use of it for formative evaluations.

The students carried out their self and peer evaluations of contributions to each task simultaneously, but they made a distinction between the contributions on each task. The academic was concerned that the SPA adjustment factors for the subsequent written assignment task were more widely dispersed than for the seminar presentations with 41% of students' whose SPA adjustment factor was outside the .95–1.05 range for the assignment, compared to 32% for the seminar presentations. For the assignment there were also some extreme values such as .72, .76 and 1.19, resulting individual marks being more than 19% different to the group mark for the assignment. The academic concluded from this that some groups experienced greater problems working cooperatively on the assignment because they did not develop the necessary teamwork skills.

Once grades were finalised and the academic was able to read and reflect on the student questionnaires that had been held as confidential research until the subject's results were finalised, it became apparent that other, complementary steps were needed to further improve the quality of teamwork. The most

revealing questionnaire responses were to questions on what students had learnt from the formative evaluation process and how they had changed their approach as a result of the formative evaluation. These responses included: 'as our group was cohesive… there was no requirement' and we did not change 'because we're satisfied with our performance' or 'we agreed we had no problem … and everyone was contributing [so] I did not need to change my approach'. These responses indicate harmonious and committed groups with no evidence of free-riding. While this provides a good starting point, it shows that they have no awareness of the need to further develop their teamwork to equip them for the assignment.

Iterative learning: Refining assessment for engagement

Consistent with constructivist approaches to assessment, the academic still believes that it is useful to begin with a simple group assessment such as seminar presentations, to provide a setting for students to learn each others strengths and to begin to devise inclusive approaches to ensure they use these strengths. But she is seeking to further explore and incorporate ways to more strongly emphasise the time and effort required to build teamwork, especially for more complex group assessments. Greater contextualisation of the results of the formative assessment of group contributions is important to consider. Specifically, she needs to convey that the seminar presentation was a task with limited choices and limited scope for different approaches, so it did not require highly developed teamwork to be completed satisfactorily. Students should not expect the same level of teamwork to carry them successfully through the more complex assignment.

After consultation with the academic learning and teaching adviser and the SPARK developer, the assessment process for the second iteration in a larger course in Semester 2 has been redesigned to reflect what the academic has learnt. There will be two group assessment tasks – a presentation and an assignment – to provide maximum opportunity for team work, but SPARK will be used twice for formative purposes. The first time will be mid-semester, after the seminar presentation, and the second time will be a little over two weeks before the assignment is due at the end of semester. This second formative evaluation may expose any weaknesses in teamwork skills while there is still time for corrective action, and more explicit guidance will be provided on the need for corrective action.

Also, in consultation with the academic adviser, the academic will 'unpack' the group work contribution criteria into more specific teamwork process components to provide students with clearer expectations about what is required. This unpacking of the often used, but taken for granted, academic discourse (Higgins et al., 2002), will involve extended discussion with students, since in the first pilot the students' preference was for very simple, plain language criteria and some proposed criteria were modified to reflect this. The Faculty's new group work website is also available now and will be used from the outset of the course to provide students with more guidance on how to develop skills required for teamwork.

Conclusions

Our study reveals the value of attending to the formative feedback process in group work assessment contexts. Students' responses demonstrate how the lecturer's previous concerns with group work have been reduced by the pre-emptive use of transparent, automated self and peer assessment. The confidential online tool for self and peer assessment not only provided an efficient teaching administrative mechanism for determining and moderating summative group marks between members, but allowed important refinements to the assessment process simply because it allowed an otherwise cumbersome process to be easily repeated several times. The results for the summative evaluations, especially in the case of the group assignment in contrast to the group presentations, were more widely distributed across the potential range than for the formative, raising questions around assessment complexity for further research.

Future iterations of self and peer assessment in the course, particularly those that focus on refining formative feedback are also worthy of further research. Guidance provided on a more structured formal process facilitating discussion of the formative evaluation results with appropriate time scheduled in the course may further enhance team skills development and individual and group learning outcomes. The implications of this study for academics in higher education extend beyond the economics and business context within which it was conducted. The development of collaborative skills to enhance team outcomes is a crucial graduate attribute of focus in almost all university contexts. Affordances from this type of educational technology provide academics and academic developers with the flexibility to trial

and design refinements to learning and assessment activities to assist students to achieve these important skills.

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