Online Self-and-peer-assessment for Teamwork in Architecture and Business Communications

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ABSTRACT: There is considerable evidence of general student scepticism regarding the purpose of team assignments and high levels of concern for the fairness of assessment procedures when all members of a team receive the same grade. Some educators are similarly anxious about not only the validity of team grades, but also the need to assess ongoing team processes in addition to the final assignment product.

This paper offers self-and-peer-assessment (SAPA) as a fair, valid and reliable method of producing information about ongoing team processes. The paper examines a pilot study investigating an online SAPA tool originally developed for a small class of architecture students. This tool is adapted for use for by students completing team assignment in two further architecture design units and for a very large class of 800 business communication students. The sample students studied on four campuses, as well as in off-campus and offshore modes. The paper focuses on the initial stages of the study to demonstrate how researchers from very different backgrounds collaborated to adapt the online tool and implement a pilot study whilst maintaining both comparability of assessment and integrity of research design.

Conference theme: built environment education
Keywords: Online Self and Peer Assessment, Group Learning

INTRODUCTION

While a range of online SAPA systems exist or are under development in Australia and internationally, many embody a specific SAPA method/philosophy and would require additional coding to be useful in alternative applications. Moreover, while many of these online SAPA systems developed in academic contexts are freely available for academic use elsewhere, almost all are based on open-source database platforms that, while good for minimising software costs, are currently incompatible with the centrally supported Oracle-based corporate database environment common to some universities.

This position paper discusses a concurrent project evaluating and developing in cross-disciplinary and cross-faculty contexts a prototype on-line self-and-peer-assessment (SAPA) model originally devised during a three-year group-learning research program at an Australian school of Architecture and Building. The wider three year research program has focused on the pedagogy of design collaboration in small groups. The current project is piloting the SAPA model in three courses that require a combined total of nearly 2000 students to take part in collaborative group assignments. The evaluation and further development of the SAPA model are prerequisite to the implementation of an Oracle-based system that would provide a centrally supported online SAPA model available university-wide.

Two of the courses that will pilot the prototype online SAPA system are offered to students of Architecture and Building, and the other is offered to students of Business & Law. One of the architecture units is a technology lecture-based subject (Building Environmental Studies), while the other is a design studio-based subject, and both are studied by students enrolled in the Architecture, Construction Management (CM) and Architecture/CM combined degrees.

The project addresses four principal research objectives under the banner of 'Fair Assessment and Effective Reflective Learning'. These are:
1. To determine the accuracy of the SAPA model by triangulating with qualitative student feedback the quantitative analysis of student marks.
2. To compare the benefits of different reflective components of SAPA across cohorts and disciplines i.e. by exposing some students to qualitative peer feedback, some to quantitative feedback, some to both and some (as the model has previously been limited to) to no peer feedback. Through this, guidelines will be drawn up that will allow unit chairs to tailor the SAPA model to the pedagogic aims of the team assignments of their own disciplines.
3. To determine the extent of collusive assessment in the present model and through this to resolve unfair online peer assessment.
4. To evaluate the practicality of an on-line SAPA model for large cohorts i.e. 1800 students in comparison to the 160 students that have previously trialled a prototype system.

1. BACKGROUND

The use of group/team work in higher education has been increasing, driven by a range reasons; including i) peer learning can improve the overall quality of student learning; ii) group work can help develop specific generic skills sought by employers; and iii) group work may reduce the workload involved in assessing, grading and providing feedback (James, McInnis, & Devlin, 2002). In addition to concerns about a lack of perceived relevance and overuse of group work, one of the strongest concerns reported by students is the possibility that group work may not fairly assess individual contributions (James et al., 2002). Self- and peer-assessment (SAPA) is advanced here as a valid and reliable alternative and/or supplement to teacher-only assessment of individual contributions to group work ((Nancy Falchikov & Goldfinch, 2000); (Sluijsmans, Dochy, & Moerkerke, 1999)).

Other benefits of SAPA are also reported; namely, promoting effective teamwork (Brown, 1995); developing professional skills in self-reflection on behaviour (Sluijsmans et al., 1999); overcoming self-rater problems when self-assessment only is used (Freeman & McKenzie, 2002); developing professional graduate attributes for working in multidisciplinary teams and lifelong learning; shifting the student's role from passive receiver to active participant in learning; making learning objectives and desired performance levels explicit to students (McGourty, Dominick, & Reilly, 1998). Applications of SAPA are reported in a wide range of academic/discipline contexts (Topping, 1998), including teacher education (Sluijsmans, Brand-Gruwel, & Van Merriënboer, 2002), computer programming (Sitthiworachart & Joy, 2003), architecture (Tucker & Rollo, 2006), medicine (Sullivan, Hitchcock, & Dunnington, 1999) and engineering (Brown, 1995; McGourty et al., 1998).

It is reported that SAPA, while being a strategy for coping with the volume of assessment and feedback required for large classes, can create a large volume of assessment data and be very time consuming if implemented manually (Ballantyne, Hughes, & Mylonas, 2002). In a 1998 review of peer assessment it was noted that computer-assisted peer-assessment was an emerging trend (Topping, 1998). Examples of the benefits of online SAPA systems can be found in the literature, including confidentiality (Freeman & McKenzie, 2002) and improved efficiency (McGourty et al., 1998). The successful use of group work involves much more than effective assessment (computer-based or not). It includes the design of assessment tasks suited for completion by teams, development of team work skills by students and the on-going management of group dynamics during the course of the team work. Design of processes and tools for the assessment of group work in isolation of consideration of these other factors is unlikely to produce a successful outcome (Freeman & McKenzie, 2002).

2. SAPA PILOTED IN ARCHITECTURE AND BUSINESS AND LAW COHORTS

2.1. SAPA at Deakin

The research project introduced here addresses rapidly emerging deficiencies in the current assessment structures of group teaching that are, it has been demonstrated (see (Tucker, in print)), highly unpopular amongst staff and students. If these deficiencies remain unchecked, the teaching of effective collaborative learning and team-working skills is impaired, and, moreover, the unpopularity of group-work blights the implementation of pedagogic strategies that, under the strain of increasing student to staff ratios, aim to overcome resource intensive individual assessment.

The following broad conclusions have been published on the use of online SAPA as a solution to group assessment deficiencies at a school of Architecture and Building (Tucker, in print). Firstly, the quality of work as measured in grades has increased in group-design assignments when continuous peer assessment is used to assess individual contributions instead of that assessment model common to most group projects – i.e. all team members receive the same grade. Secondly, students greatly prefer continuous online peer assessment of an individual's contribution rather than all team members being allocated the same mark. Indeed, this prior research has shown that the introduction of a more participatory student-centred assessment forum, where reflective learning takes place with peers, appears to empower students to develop in tandem with their creative skills the diverse interpersonal, professional, and cognitive and conflict management skills needed to filter and synthesise more efficiently the information necessary for working in teams.

The prototype SAPA system reported on here is still to be systematically evaluated, remains untested in other schools, and requires further development to allow for its tailoring to the pedagogic demands of other disciplines. Such development, discussed in this paper, will establish not only a resource efficient solution to unfair assessment in group assignments, but through this will identify indicators and benchmarks yielding best practice methods for developing collaborative education structures. These structures will ensure high levels of knowledge acquisition and performance standards within student cohorts. The SAPA model advanced in this paper also had to address a number of core university teaching and learning policies and procedures on assessment. We shall now briefly consider how these restrictions affected the design of our research and our use of SAPA.

2.2. Comparability of assessment and the transparency of assessment and its pedagogical intent

Assessment practices and procedures at universities should ensure quality control, consistency and equity in assessment. The development of a SAPA model and the testing of its variations can present, however, challenges to maintaining assessment comparability. The internal funding body of teaching and learning research projects at the university where our model was trialled, for instance, demands that projects are completed within one calendar year. This restriction has meant that to maintain the integrity of research design and data collection, our project could only compare variations on the SAPA model across two test cohorts, for in 2007 only two cohorts of equivalent demographics were enrolled in courses with equivalent pedagogic challenges and the same teachers. The availability of only two test cohorts led to a restriction in the SAPA variations that could be compared. The project had originally intended to compare against a control group (which did not use SAPA) four variations on the type of peer feedback that team-mates

would receive on their contribution to a collaborative project. These variations were; i) no peer feedback; ii) quantitative peer feedback only; iii) qualitative feedback only; and (iv) both quantitative and qualitative feedback.

Whilst it had originally been envisaged that, for an 800 student cohort, teams might be given the choice of what type of feedback they preferred, this option was rejected on two counts. The first was the likelihood of validity impairing biases that are inherent in self-selection skewing the exit questionnaires, and the second was incomparability of assessment. If we divorce assessment from feedback, it could be argued that the self-selection of feedback type here would not differentiate assessment, for no matter what peer feedback a student received their final mark would be arrived at via the same process i.e. a student's individual mark would be calculated by adjusting the team grade (assessed by the teaching team) by peer assessment of that individual's contribution. In line with research that has shown the advantages of students benefiting in the short and long-term from peer feedback (Topping, 1998), it was decided not to risk disadvantaging students by offering those in the same cohort different forms of feedback. This decision meant, however, that only two feedback options could be compared in two test cohorts, and, moreover, that this would leave no control group. Extending the research program one semester beyond the calendar year offered the following solution to this; during the first semester of 2007 the first pilot cohorts would have access in the SAPA to both quantitative and qualitative assessment. During the second, the comparable cohorts would receive no peer feedback. All cohorts would be asked to complete entry and exit questionnaires on their experience of group work prior to and after their use of SAPA. Finally, in the first semester of 2008, entry and exit questionnaires would be offered to a control cohort who did not use SAPA. Thus, adopting this revised program made it possible to compare the feedback of students not using SAPA against those using SAPA with peer feedback and those using SAPA without feedback.

The primary focus of assessment should be to encourage, direct and reinforce learning. Assessment should therefore be designed to assist students in their learning. Assessment should also be capable of indicating achievement, maintaining standards, providing certification and be as transparent as possible. Assessment tasks devised for a course or unit should therefore explicitly reflect in scope and depth the stated objectives for that course. Assessment transparency should not be restricted to giving the students a precise explanation of how a SAPA models calculates individual contribution, it also requires that students are made aware of the pedagogical intent of the model and, in the case of research, of the research aims of testing that model. As a result of prior studies into the teaching of group design projects (Tucker & Reynolds, 2006), the teaching of team-working skills had already been introduced into the design curriculum. The importance of assessment transparency to the SAPA model led in 2006 to the inclusion also of presentations to the students on the pedagogical intent of the model, as well as well tutorial exercises that explored the students' abilities to assess the work of others. This ability was presented to the students as a core attribute for professionals that is prerequisite to effective team working.

2.3. Research Program

The outcome of the research questions are addressed through several forms of evaluation: formative evaluation of student feedback through questionnaires; summative evaluation of student achievement through reflective folio and journal assessment and the analysis of grades and graduate outcomes. An illuminative evaluation is also included through focus group discussions. The project consists of five broad phases. The first has implemented two pilot applications, one in Architecture that is a core subject in the second year of the undergraduate degree and one in Business and Law, with each testing a peer feedback mode giving students both quantitative and qualitative peer feedback. This phase also includes the collection and collation of entry questionnaires (see section 4) that collect demographic information as well as canvass student's opinions of group work and its assessment prior to the units that are implementing the pilot SAPA application. The second phase will evaluate the first two pilot applications through focus groups involving the students that have piloted the SAPA application and through a comparison of entry and exit questionnaires. The third phase will implement a SAPA model that does not give peer feedback in two further pilot applications, again one in Architecture and one in Business and Law. The second Business and Law course is, as previously discussed, pedagogically equivalent to the first Business and Law course while the second Architecture course is a collaborative technology assignment that is a core subject in the second year of Architecture, CM and Architecture/CM combined degrees. This third phase will include the collection and collation of entry questionnaires. The fourth phase is equivalent to the second and it will evaluate the second two pilot applications. The final phase will be the analysis of entry and exit questionnaires given to the 2008 cohorts enrolled in the same second year Architecture and Business and Law courses that were the focus of phase one. However, in 2008 the units will act as control groups by reverting to the assessment strategy of allocating the same or almost the same mark to all team members.

2.3.1. The nature of the assignments: Architecture – Design and Building Environmental Studies

Two courses are trialling the SAPA model in 2007. The first is a second-year level design unit studied by 120 Architecture and dual degree Architecture/CM students. The design unit comprises two individual assignments and one, worth 37% of the course marks, which requires teams of three students to design collaboratively small-scale dwellings in one of three sites remotely located (without grid electricity or water) in one of three Australian climatic zones. The challenge for students is to use the climatic conditions to inform a house that is largely self-sufficient and built for the most part from local materials. The clear intent is to get the students thinking from first principles about the idea of sustainable development.

The second course is a second-year level Building Environmental Studies unit studied by 170 Architecture and dual degree Architecture/CM students. A five-person team assignment that lasts for the duration of the course, which is worth 50% of the course marks, requires students to assess the environmental performance of a house designed by an eminent local architect. After assessing the house, the teams must redesign it for greater energy and resource efficiency by using passive heating and cooling techniques and through the careful selection of construction materials. At the end of the semester, the teams present the house, designed for greater sustainability, to its original architect.

The student guides for both units make clear the pedagogical intent of the team projects, in the context of teaching sustainable design, in an explanation worth repeating here.

> As worldwide issues of environmentalism and socio-cultural need are in global trade-off, the responses demanded of built environment design teams are increasingly complex and inherently multidisciplinary. Recognising this, the Royal Australian Institute Of Architects (Education Policy 2005 - (RAIA, 2002)) and Institution of Engineers, Australia (IEAust, Accreditation 1999, as cited in (Carew & Mitchell, 2002)), explicitly list collaboration and multidisciplinary learning skills as essential attributes of graduates able over time to contribute to a globally sustainable future... The teaching and learning of sustainability must address this issue of multidisciplinary collaboration in order to foster more productive solutions in future professional practice. By addressing these issues, this unit aims ultimately at the education of graduates who are able to bring leadership to multidisciplinary design collaborations co-operating across international boundaries towards a global sustainable future.

2.3.2. The nature of the assignments: Business and Law - Business Communication

Business Communication is a compulsory course at second year level in a Bachelor of Commerce award. 1800 students enrol in the course over two semesters each year, on three campuses within the state of Victoria, in off-campus mode and at two offshore partnership campuses in Singapore and Malaysia. Up to fourteen different members of staff are involved in unit delivery at any one time, with uniform teaching materials and a strict comparability of assessment protocol. Approximately 60% of the cohort comprises full fee-paying, international students, primarily from South East Asia, China and the Indian Sub-continent. The aim of the unit is to broaden students' understanding of the complexity of communication and their awareness of the skills and strategies required for effective communication within a range of contemporary professional business contexts.

Assessment in the unit involves individual tasks, team tasks and an exam. For the team assignment, students work in teams of four over a period of up to six weeks on an oral and written report, worth 35% of their total score for the unit. Teams have a great deal of autonomy in this integrated assignment and are responsible for planning and allocating component tasks and for combining their research. They work collaboratively and co-operatively to research a chosen scenario and are required to meet and communicate regularly, either face to face or electronically in the case of off-campus students.

The students present a formal oral report in a three-minute presentation (worth 10% of course marks). Team members are assessed individually (90%) but receive a common teamwork component (10%). They are then required to produce a formal written report of 4000 words (20%). This document receives a team score, which can then be individualised if there is consistent evidence of uneven contributions in terms of effort, quantity or quality by different team members. Students are also required to maintain an individual reflective journal during this period (5%). For this task they must analyse their team experiences in light of what they have learned from their reading, lectures and tutorial exercises on three unit topics – Interpersonal Communication, Teamwork and Decision-making and Intercultural Communication.

3. PEER ASSESSMENT IN THE PROJECT

The SAPA online tool discussed in this paper requires students to rate and comment on each other on a weekly basis. In common with the online SAPA system reported by Raban and Litchfield ((TeCTra) (Raban & Litchfield, 2007), the SAPA tool presented here aims to create a formative, diagnostic and summative assessment environment in which students are encouraged to learn peer-assessing skills using quantitative ratings and qualitative comments. The online tool and system for data collection, presentation and calculating individual contribution frees subject coordinators from the considerable time it takes to process similar paper-based strategies.

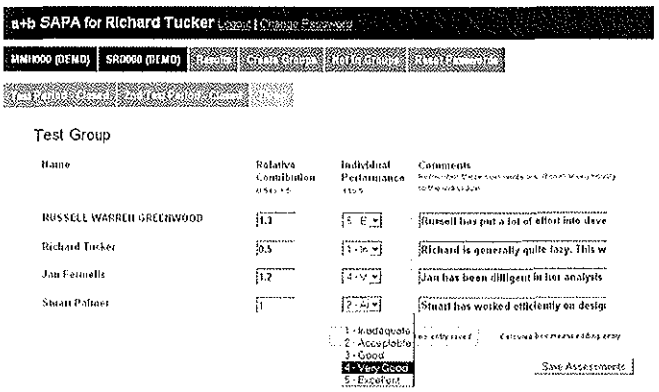
3.1. Individualisation of Team Scores

Each team receives a team mark for their assignment that is assessed and moderated by their tutors and unit co-ordinators. This score is then individualised if there is evidence of unequal contributions by different team members. This decision is made by the unit co-ordinator on the basis of SAPA ratings, peer comments and feedback, tutor feedback and any other information received by the unit co-ordinator. Students are asked to rate contributions to a group assignment made by themselves and by each member of their team. Students are informed that the purpose of this is to assist their teachers to identify teams whose members contributed unevenly to more appropriately individualise students' scores. When awarding scores and ratings, students are asked take into consideration whether each member: attended meetings and tutorials, actively communicated with team-mates and responded to others' messages, participated in decision-making, completed work they offered to do or were designated, contributed work of the required standard and/or form, met agreed deadlines and shared the workload.

3.2. Making SAPAs

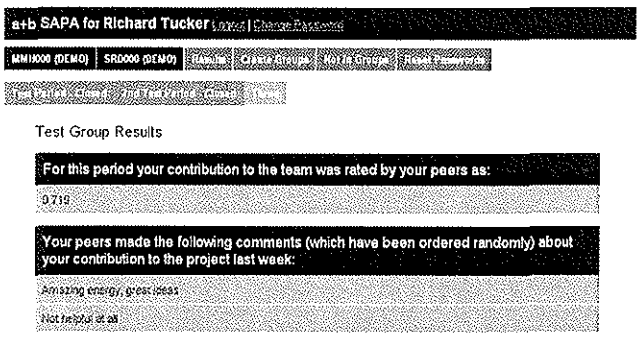
In all units piloting the SAPA model, students have to make five weekly assessments between the beginning and the submission of six-week team assignments. Cohorts were informed that making these assessments would be regarded as an indication of active participation in the assignment. Students who made at least four assessments received their complete score after it had been individualised. Students who made less than four assessments had 2% of the team mark deducted from their individualised score for each missed peer assessment. Students made their assessment by logging on to a password protect web-site that was accessed via the university on-line study portal. Students had a window of four days (around the weekend) to make their assessment and they were able to change their entries at any time before each time window expired. The log-in page asks students to select the appropriate course code - in order to allow in future for the likelihood that students may be involved in multiple team assignments. The following (Figure 1) is a screen-shot of the SAPA model as students see it after having accessed the appropriate course code.

Figure 1: SAPA screenshot



Students are asked to make three different assessments. The first measure asks them to award their peers a relative contribution score of between 0.5 and 1.5 for each team member. This score must add up to the total number of members in the team. Thus, for example, if students believed that all team members contributed evenly, they should award everyone (including themselves) a rating of 1. Or, if they believed that they had contributed, say, almost one and a half times that of all three team mates in a four person team, they might award themselves 1.3 and their three team mates each 0.9. The clear intent of this first measure is to encourage students to consider the question of fair workload distribution. This first measure is backed up by a second that asked students to rate the individual performance of each other, using a drop-down menu, on a five point multiple-response Likert scale evaluation. The Likert evaluation, which is commonly used to rate aspects of the group experience (Ellis & Hafner, 2005), allows for the coding of responses and the subsequent statistical analysis of possible patterns of bias in student assessments. While the Likert evaluation aims to encourage students to consider the quality, as opposed to the quantity, of each other's contribution, it is translated into a numeric evaluation that can used in combination with the quantitative relative contribution assessment to arrive at a holistic evaluation of each member's contribution. The combination of these two modes of peer assessments also avoids peer over-marking, which is a problem common to many peer assessment methods (N. Falchikov, 1986; Freeman & McKenzie, 2000). The purpose of the third measure, which asked students to comment on the performance of their peers, was twofold; firstly, to elucidate for unit co-ordinators anomalies or unexpected final evaluations and, secondly, to develop in students the evaluation, feedback and reflective skills that are key learning objectives of teamwork projects. It was hoped, as Dominick et al. (1997) have found, that students who completed the qualitative feedback section, even if they themselves did not receive feedback in the forms of constructive or informative comments, might be motivated to improve their performance.

Figure 2: SAPA feedback screenshot



In the pilot cohorts that gave peer feedback to students, all scores and comments were made available to each member of the team after the assessment time expired. However, all scores and comments were made anonymous by randomising the order in which they appeared in the feedback. The above (Figure 2) is a screen-shot of the SAPA model as students see it when accessing feedback.

At the end of each weekly assessment, and at the conclusion of the team assignment, an assessment matrix is generated for each team that calculates for every student a multiplier of the team grade that will be used to individualise

marks if there is evidence of significant unequal contribution. Before the calculation is made, all self assessment marks are removed from the matrix to negate the bias of self over-marking. The multiplier is calculated as follows:

1. Firstly, the total of all students' Individual Contribution Marks[1] AND Individual Performance Marks[2] is divided by the number of students in a group to give the Group Mean Peer Assessment (GMPA).
2. Secondly, the total (ITPA) is calculated of each individual student's Individual Contribution marks AND Individual Performance Marks.
3. The Peer Assessment Multiplier is equal then to ITPA divided by GMPA

Where:
[1]. Individual Contribution Marks are those marks awarded between 0.5 and 1.5.
[2]. Individual Performance Marks are those marks awarded from 1 to 5.

The peer assessment score a student is given each week and at the completion of the assignment indicates therefore how their peers' rating of them compares to the group average. Thus, as it is explained to students, if their rating is less than 1 they are considered to be performing lower than the average team performance. Equivalently, if their rating is greater than 1, they are considered to be performing higher than the average. Students are advised to aim for a peer assessment score of close to 1 or greater. Previous pilot trials of a prototype of the SAPA model have indicated that SAPA ratings of between 0.8 and 1.2 are the norm (see (Tucker, in print). Significant differences in SAPA student scores within any team result in deeper investigations into the evenness of student contributions.

4. ENTRY AND EXIT QUESTIONNAIRES

As part of the study, questionnaires were completed by the students. These questionnaires are partly based on a combination of prior questionnaires used by Cheng and Warren (1997) (which in turn is based on Burnett & Cavaye (1980)); Walker (2001); Sivan (2000); Davies (2000); Ballentine, Hughes and Mylonas (2002); and Lejk and Wyvill (2002). The decision was taken to follow Cheng and Warren's example by using both pre- and post-questionnaires, but to amend the design of the questionnaire to allow students to write comments following each section of questions. The reason for this amendment was to try and ensure that comments were related to how students were feeling at the time that they made their rating, rather than at some later time when they might revert to stereotypical replies. The pre- and post-questionnaires were identical except that in the pre-condition the questions were in the present tense, whilst in the post condition the past tense was used. The two-page pre-questionnaire began with a section assessing student demographics. This was followed by eight questions on students' attitudes towards group-work in the first of two Likert sections, whilst the twenty questions in the second Likert section questioned attitudes towards peer assessment. All responses were given on a 5-point Likert scale anchored with 1 for "strongly agree" through to 5 for "strongly disagree." Sufficient space was provided at the end of each section for the respondent to add written comments on any related general concerns, comments on what they liked the most and least about group work and its assessment, and what changes they would like to see made to each. The questionnaires were labelled with each student's personal student number to enable the student's pre- and post-responses to be paired together. Procedures governing the recruitment of students, their briefing and questioning, and the collection and storage of data where approved by the Deakin University Human Research Ethics Committee (EC 70-2007).

5. PARTICIPANTS

The participants in phase 1 of the study who completed the first-semester group-based assignment, the SAPA and entry questionnaires were 79 (out of 117) second-year Architecture students and 547 (out of 822) second-year Business and Law students. The Architecture cohort consisted of 37 groups of three, one group of two and one group of four. The Architecture groups were self-selected by students, but to discourage the option of working with friends their choice of teammates was restricted to pools of twenty-five students. Such restrictions have been shown to encourage diversity within design teams that results in a more challenging learning environment (Tucker & Reynolds, 2006), for such heterogeneous groups expose the learner to multiple perspectives based on the diverse backgrounds and experiences of the other members of the group.

The Business and Law cohort consisted of 190 self-selected teams of which the vast majority had four members.

6. RESULTS

At the time of writing, results are restricted to an overview of the SAPA ratings for the Architecture students who were the focus of phase 1 of our project. All the first-semester Architecture students made at least one entry using our on-line SAPA. In total, the cohort made 1406 entries and missed 359 entries. On the professional judgement of the teachers assessing, it was decided that marks would only be individualised if the range of SAPA ratings in a group was greater than 0.15 (such that the lowest rating subtracted from the highest rating was greater than 0.15). Thus, 21 out of 39 groups had their marks individualised, or 64 out of 117 students. The average range for the cohort was 0.275, and the highest range of ratings for a team was 0.688 (from 1.295 to 0.607). For this team, the tutor mark was 63% and the individualised marks were therefore 38%, 69% and 82%. If 40 and 80 represent the boundaries for failure and higher-distinction, it can be seen that the same piece of work produced both outcomes for different students in only a 3-person team. Such a range might not be acceptable for some assessors, and this highlights a possible danger of implementing such a SAPA model. As Sharp notes (Sharp, 2006), how great the numerical differences are in the ratings that students use to reflect unequal contributions will vary from group to group (and perhaps also within groups). Thus, as Sharp also suggests, it may be necessary to multiply the SAPA rating by a value that can vary from group to group so that the range

of individual marks is satisfactory. Our SAPA tool had hoped to minimise such ratings differences by restricting the contributions ratings to between 0.5 and 1.5, but in retrospect it may be that this range was still too wide.

It became hard to believe that there had not been collusion within one group in the Architecture cohort. How closely matched the ratings were of two of the students, who it was known lived together, and their obvious difference from the ratings of the third student strongly suggested that the first two students felt that the other was not contributing evenly and decided to collude with each other to convey this in their ratings. After investigation by the unit chair, the two agreed that perhaps their rating had exaggerated the differences in contribution and they thus agreed to an adjustment. This demonstrates the importance of carefully monitoring throughout an assignment what the SAPA is showing in individual cases.

7. IMPLICATIONS FOR FURTHER RESEARCH

When analysing the feedback and results of the further stages of our research the variables that will be considered for both assessors and assessees will include, as Topping has suggested (Topping, 1998), familiarity and experience in peer assessment, geographical and/or cultural origin, chronological age, year of study, ability and gender. In addition to this, our research will also analyse the response to SAPA and, in particular, to the different feedback options that our model will compare, in consideration of the variable of group size. For it is clear, even at this early stage of the project, from anecdotal evidence and the uncritical nature of comments made by students in their assessments, that even if qualitative feedback comments are anonymous, students in small teams are unwilling to openly criticise peers who might easily deduce which team-mates have made comments.

CONCLUSION: The main recommendation from early stages of this study

Despite the size of the classes, marks were available on the day after students made their final SAPA rating. This was far earlier than in previous years because accessing peer assessment factors via the on-line software tool took substantially less time than the collation and calculation of individual paper-based assessments by unit chairs – the method used for the Business and Law cohort in previous years. This meant that students were able to access both their team marks and their individualised marks for the team assignments only a few days after the assignment submission. Perhaps tellingly, not one student made a complaint about the individualisation of their mark. The ease of accessing the online SAPA ratings is important in the face of increasing academic teacher workloads that leave little time for the administration of more elaborate self-and-peer assessment methods.

Staff have noticed an improvement in class spirit during group assignments using the on-line SAPA model from that experienced in equivalent past assignments that used more rudimentary forms of peer assessment. Increased maturity and confidence in many students as the assignments progressed was also apparent. Numerous students reported that the "pressure valve" SAPA provides throughout the project allowed groups to function well despite unequal contributions. The SAPA model can thus be seen to have allowed students to be tolerant of the fact that their peers might not have the same learning and assessment aspirations. Through this toleration, and other mechanisms that will only become clear once entry and exit questionnaires have been analysed, our on-line SAPA tool seems to have changed for the better the group dynamics seen in teams collaborating in the Architecture and Business and Law courses under study.

Peer-assessment has been shown to promote independent, reflective, critical learning (Somervell, 1993), to enhance in students the motivation for participation (Michaelsen, 1992) and to encourage students to take responsibility for their learning (Rafiq & Fullerton, 1996). Moreover, online SAPA systems have been be found to solve problems of confidentiality (Freeman & McKenzie, 2002) and improve assessment efficiency (Lin, Liu, & Yuan, 2001) (Freeman & McKenzie, 2002). The findings of our project to date support the positive contribution of on-line self-and-peer-assessment within student group-based assignments.

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