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The development of innovative teaching methods, informed group structures and fair assessment models for the teaching of group design projects

Strategic teaching and learning grant
The STALG group learning project was prompted by constraints in sessional teaching funds that in 2003 restricted each third-year design student at Deakin to a maximum of eight minutes per week one-to-one teaching time. In common therefore with many other schools across Australasia, Deakin students could not rely on one-to-one contact with tutors to advance their designs. One solution to this problem was for tutors to review fewer assignments, but at greater depth, by setting group design projects. The following pages will describe the research-informed evolution over three years of one such project taught at Deakin.

Team selection and collaborative structures
Tutors can allow students to self-select team-mates or allocate them to specific groups. Allocated groups can then either be randomly assembled or engineered to create teams containing a range of experiences and abilities. Each method has its own merits. Although some students prefer to be allocated to a group and may view this as fairer, particularly if the groups are randomly selected, experience at Deakin has shown that self-selecting groups are more popular for they minimise conflict and reduce the need for tutor intervention in disputes. For these reasons third-year design students in 2003 were allowed to choose their own team-mates. The team work of 40% of these groups could be described as 'democratic' collaboration.¹ This resulted when there was no clear leader and individual ability levels were similar, discouraging the development of in-depth constructive criticism. The democratic collaborators, who more often than not chose to work with like-minded peers, could be split into three sub-groups - the high, low and the average achievers as defined by their previous project marks. The high quality of work produced by the high-achieving teams contrasted against the work of the low achieving teams - a contrast that became a source of discontent for the low achievers. Their initial frustration at their own perceived lack of ability became externalised to discontent with the course; feeding into a notion described in the field of social psychology as the 'Self-Fulfilling Prophecy in the Classroom.'² It was decided in future to control team selection to avoid putting poorer students in what they themselves identified as a situation that amplified their weaknesses rather than addressing them.

The least common of the three primary collaborative modes, accounting for only 27% of the students in 2003, can be defined as 'oligarchic.' These groups are generally driven by one or two high achievers. The organization of the remaining 33% of the teams were described via the Platonic definition of 'timarchic' societies, for in common with Plato's description of a society characterised by conflict this last type of group was born out of dissent, which often resulted in piecemeal designs.³
The engineering of teams in 2004 to contain students of a range of abilities evened out the significant disparity in the quality of work that in 2003 had undermined the self-confidence of low achieving students. It may also be noted that in 2004 no team failed the group project. However, this achievement was counterbalanced by a marked increase in the proportion of timarchic collaborative groups in 2004. Grouping strangers rather than friends seems to have led to more conflict, and although conflict in groups has been shown to often lead to better outcomes, in the student design studio it can lead to a working environment that stifles collaboration.

**Student results**

By uniformly allocating students to teams according to ability (as indicated by their grades in the previous semester), the grades of the 2004 groups were effectively evened out. Thus although no group failed the 2004 project, there was only one higher distinction project. While it is arguable whether the more even distribution of marks is desirable, the level of marks across the year would indicate that group working was becoming a success, if not altogether a popular one. For in 2004, the average mark was 8 percentage points higher than average achieved by the same students for the subsequent individual project.

**Continuation into 2005**

The 2005 STALG funded group learning project observed two cohorts in group design projects with highly contrasting programs and structures. In the third-year studio Atelier Geelong teams of five were observed, compared to teams of three in 2003 and in teams of six and seven in 2004. Nine teams in Atelier Geelong were observed to evaluate communication between students in the studio using an observation template recording contribution.

The STALG project can be divided into five stages. The first is survey, which has included the collation of questionnaires from unit chairs relating to student performance in individual versus group design projects from schools throughout Australasia and the U.K. The second stage is the personality-type testing of students using the Keirsey Temperament Sorter II - a seventy-question psychological characteristic assessment that is based on the Myers Briggs test. The third stage is the observation and analysis of student performance and feedback. In Atelier Geelong, central to every studio day (one day per week) for each team is a thirty-minute design-team/client-team meeting chaired by a tutor. Nine of these meetings each week have been observed by a research assistant who has taken no part in the teaching and assessment of the unit. To research the merits of diversity within collaborative teams, the design teams of five have been self-selected by the students from within three pools composed according to personality type. The results of the Myers Briggs test were used to form these pools. The first pool consisted of students all of similar personality types, the second of students of diverse personality types, and the third of students who did not consent to the test who were placed with other students chosen randomly.
The fourth stage of the STALG project consisted of focus group discussions that aimed to provide illumination of issues raised in the questionnaires and tutorial observations. The fifth and final stage of the project is digital folio and unit assessment evaluation and moderation. We shall look now at some of the data revealed by the first four of these stages.

Survey
To date fourteen questionnaires have been returned by design unit co-ordinators across Australasia. Although it is perhaps premature to draw conclusions from this limited data, it would seem that the problem of insufficient teaching resources is widespread, with design students being limited to an average of fifteen minutes per week one-to-one studio teaching. As a result, most design units teach at least one group project. Without exception, all unit co-ordinators report higher marks for group projects, with mean grades averaging 5% higher for group design projects.

Personality type testing
Seventy-six of the ninety-five third-year students who were present at the introduction of the STALG project agreed to take part in studio observation and sixty-seven completed the Keirsey personality test. The results of the type testing has shown that while students were, as illustrated in Figure 1, of a wide range of personality types, a number of ‘function’ types dominated their motivation. Of the students that sat the test, thirty of which were female, thirty-seven male, 57% can be described as extroverts while 43% can be described as introverts. The most common of Jung’s eight types in the cohort is the Extroverted Sensation type, which number 39% of those tested, whilst the least common was the Introverted Thinking type, which numbered only 9%. 67% of the cohort was driven by Sensation rather than Intuition, and 70% by Feeling rather than Thinking. Most notably, 90% could be characterised as Judging rather than Perceiving.
Thus, 55% of the cohort conform to the one-of-four Myers type termed as the Concrete Co-operators—a type Myers had observing their close surroundings with a keen eye for the purpose of ‘scheduling their own and others’ activities so that needs are met and conduct is kept within bounds.’ Students of this type were grouped together in one pool to form seven teams. The grades achieved by the groups would suggest that the range of personalities within a team had little effect on the quality of design produced, for the average mark obtained by the three types of group was exactly the same, namely 64.8%. Yet it is worth noting that the number of timarchic team collaboration structures appeared to be drastically reduced. It can be reasonably postulated that this may be due to each group comprising of at least one ‘Concrete Co-operator’ personality type member who’s disposition towards regulating goals and conduct within the group in the absence of tutor intervention may have advanced the team’s cohesion.

For the three years the team design project Atelier Geelong has been run, 64.8% is the highest average grade achieved (see Fig. 2). Although a detailed analysis of this finding is still needed, it could be suggested that the high marks obtained by the 2005 and 2004 cohorts can be attributed partly to the team formation restrictions placed on both programmes. Restrictions discouraging the option of working with friends, which encouraged diversity within teams, seemingly lead to a more challenging learning environment. In 2005 this was achieved without the increase in timarchic collaboration that resulted from engineered teams in 2004, for allowing students to choose team-mates from pools avoided personality and social conflict. Restricted pools is a group formation compromise that is popular amongst students too, for 82% of the 2005 cohort, compared to only 51% in 2004, claimed to enjoy the Atelier project.
**STUDENT RESULTS**

- Mean Mark
  - 2003 - 57.8
  - 2004 - 59.3
  - 2005 - 64.9%

Figure 2: Graphs comparing Atelier marks from 2003 to 2005 (Source: Author)

**Student feedback**

Two questionnaires have been completed by the majority of students in third year. The first focused on group work prior to third-year, and the second enquired about group work in the 2005 Atelier project. The notable findings from the first questionnaire are as follows. 70% of students had found group work in prior units a positive experience, and largely for reasons relating to positive learning outcomes. Yet this positive impression of group work was countered by students' preference for individual assignments, for only 35% preferred to work in groups prior to third year. The most popular size of group was three to four. 18% of students preferred groups to be randomly allocated by tutors, 35% preferred to choose their own team-mates, while 30% preferred groups engineered for diversity. Given a choice of four types of peer assessment, the majority of students preferred anonymous self-assessment. This is not surprising in light of the fact that 70% of students felt that in previous group projects not everyone had contributed evenly.

In the second questionnaire, 82% of students found group work to be a positive experience, and this positive impression was reinforced by students' stated preference for group design projects in third year, for only 37% claimed a partiality in the second questionnaire for individual projects. After working in groups of five for Atelier, the most popular size of group was once more stated as three. 33% of students preferred to choose their own team-mates, while 32% preferred to choose members from limited pools – as they had at the beginning of Atelier. What is noteworthy about this feedback is its refutation of the common perception that group-design is unpopular amongst students of architecture. The students' greater preference for group-design projects over individual projects after Atelier was underlined when
they were offered the option of reforming new groups of any size for a two-week landscaping project that builds upon Atelier, for only 16 of 96 students chose then to work on their own. This may also be due to the developmental stages of group development (i.e. the forming, storming, norming and performing stages identified by Tuckman (1965 & 1977)) having been worked through to attain a harmonious and productive working environment. Of the remaining 25 groups formed for stage-two of the project, 19 were comprised solely of students who had worked together for the first stage, which left only 6 entirely new groups. This reinforced a significant if not unexpected determinant of self-selected team structure that was revealed at the beginning of the semester – namely, collaborative history. For the majority of the 2005 third-year design cohort the experience of having worked before with someone significantly influenced their choice of team-mate. Students clearly prefer to play a part in choosing who they work with, but design outcomes as reflected in grades would suggest that their choice should be controlled.

Given the choice of the four types of assessment, 69% preferred the anonymous on-line peer self-assessment model used for Atelier in 2005 and 58% of students felt that everyone had contributed evenly for the project. In the opinion of the teaching staff, and of those students who attended the focus group, continuous peer assessment throughout the unit, which allowed for penalty and reward, significantly discouraged free-riding by team-members. By creating a non-confrontational forum for expressing dissatisfaction with under-performing team members, the assessment model also prevented disunity within teams, which fostered a more positive learning environment.

Further conclusions – the facilitating tutor

Although the data from studio observation is still being compiled, the presence of an observer has already informed teaching. In order to allow observation of student collaboration the client/design meetings that form the basis of the Atelier tuition model were restructured around a less assertive teaching model. Only at the end of the sessions were tutors allowed to lead the discussion in a summing-up of design progress. After a short number of meetings, students adapted to this process and began to establish a dialogue of critical review that advanced designs without a reliance on tutor intervention. Here the tutor acts for the large part merely as a facilitator. The spirit of collaboration fostered in these sessions contrasted to the unobserved sessions, the tutor often reverting to a more assertive and traditional lecturing role, focusing attention on those within the teams who were leading the design. This often disassociated the majority of students taking part in the meeting. What has become clear therefore to those teaching design at Deakin is something that educators in other fields have known for some time, namely that group-learning requires a very different model of teaching, and that this model can have advantages of over teacher-centred one-to-one tutorials. The introduction of a more participatory student-centred design forum where learning takes place collaboratively with peers, rather than in an individualistic or competitive manner, appears to empower students to develop in tandem with their creative skills the interpersonal, professional, and
cognitive skills that are needed to filter and synthesise more efficiently the relevant information necessary for designing. Such a participatory model may even, it is hoped, foster sensitivity in students to listen as professionals to their real clients and users.

In recognition of the escalating financial and time constraints within teaching departments leading to an increase of group focused teaching models this paper has proposed to lead an enquiry into the effects of group management and the assessment of these groups in the student design studio. We might draw from the trends that can be seen in the findings the following conclusions:

• Students perform better in group design projects than in individual design projects.
• The quality of work as measured in grades increases with continuous assessment that is anonymously peer assessed.
• Students prefer to other models continuous peer assessment of an individuals contribution to a team.
• Students prefer continuous assessment to design projects assessed largely on final submissions.
• Students certainly see the learning value of continuously assessed tasks as a means of developing design solutions.
• Restrictions on group formation discouraging the option of working with friends, whilst leaving the student with a degree of choice (to avoid ‘adversaries’), encourages diversity within teams and leads to a more challenging learning environment.
• The most popular size of group is 3-4.

These preliminary findings have successfully advanced the aim of researching and developing an improved teaching methodology for group work in the design studio. This conclusion is supported not only by the theoretical and practical experience of the researchers and tutors involved but is moreover directly informed by the students’ experience of the design studio – students who are the direct consumers of the different teaching, assessment and group models explored and developed here. Although these models still require further testing against a larger sample size and continued development, there are already significant findings allowing for improvements to be made to the teaching methodology and assessment models of the student design studio.

2 Elliot Smith and Diane MacKee, Social Psychology, Santa Barbara, CA, 2000, pp. 84-5.


4 In 2003 the difference in performance had been 3.5 percentage points. Moreover, whereas the 2004 cohort outperformed the 2003 cohort by only 1.8 percentage points for the second year design course and by an average of 1.6 percentage points across all other courses, in the team project the 2004 students outperformed those of 2003 by 7 percentage points.

5 The psychological types identified by the Myers Briggs test were first discussed by Carl Jung in: C. G. Jung, Psychological types, or, The psychology of individuation, H. Godwyn Baynes [trans.] London: Kegan Paul, Trench, Trubner, 1921 (1921). Jung postulated that people have a multitude of instincts, which he termed 'archetypes,' that drive them. He argued that our natural inclination to either 'attitude' type - 'extraversion' or 'introversion' - is combined with our preference for one of what he called the 'four basic psychological functions' - namely, 'thinking' (identified by the letter 'T' in Myers Briggs testing), 'feeling' (identified as 'F'), 'sensation' (identified as S), and 'intuition' (identified as 'N'). Our preference for a psychological function is characteristic, he wrote, and so we can be identified or typed by this preference. This gave Jung eight psychological types - the Extraverted Thinking Type, the Extraverted Feeling Type, the Extraverted Sensation Type, the Extraverted Intuitive Type, the Introverted Thinking Type, the Introverted Feeling Type, the Introverted Sensation Type, and the Introverted Intuitive Type. With the addition of two further characteristics, either Judging (J) or Perceiving (P). Myers Briggs based tests identify 16 personality types - ENFJ, ENFP, ENTJ, ENTP, ESFJ, ESFP, ESTJ, ESTP, INFJ, INFP, INTJ, INTP, ISTJ, ISFP, ISTP, and ISFP. Of these 16, Myers describes for broad groups, the Concrete Co-operators (the SJs), the Abstract Co-operators (NFs), the Concrete Utilitarians (SPs), and the Abstract Utilitarians (NTs).

6 At the time of writing, digital folio and unit assessment evaluation and moderation is yet to take place.

7 See footnote no. 5.

8 Of which 61% were male.


10 Note that at the time of writing the data from studio observations was still under analysis for trends relating the personality make-up of groups to the collaborative processes of studio work.

11 Of the other factors that may have contributed to higher grades as Atelier has been developed, the switch to continuous assessment, from marks largely based on final submissions, is probably the most significant. This topic is further explored in a paper ('The Impact of Assessment Modes on Collaborative Group Design Projects') presented by Richard Tucker in June of 2005 to the First International Conference on Enhancing Teaching and Learning Through Assessment in Hong Kong.

12 Sixty-eight of the ninety-five completed the first questionnaire, and sixty-seven students completed the second.

13 83% preferred to work alone.

14 By awarding the same mark to the whole team, by open round-the-table student self-assessment of contribution of team members, by anonymous self-assessment of contribution of team members and by tutors assessing team members' contributions through individual submissions within the team submissions.

15 Only 12% of students stated a preference now for groups to be randomly allocated by tutors, while 21% preferred groups engineered for diversity.