

Making a Difference: 2005 Evaluations and Assessment Conference. 30 November-1 December, Sydney.

Evaluating the Use of Collaborative Learning Assessment: A Case Study in Psychology Research Methods

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A collaborative learning strategy was designed to facilitate the understanding of concepts and development of skills in research methods. Students' attitudes towards the collaborative learning strategy were assessed prior to commencement of group assignments (Time 1) and upon completion of group assignments (Time 2). Students' final grades and distributions of those grades were compared to the final grades and distributions of students from the previous year. Students from the previous year had completed identical assignments independently in a non-collaborative learning environment. Results demonstrated that students' attitudes toward the collaborative learning strategy were more positive after the collaborative learning experience and that there was a significant improvement in the final grades and grade distributions when this approach was used.

Two of the primary issues often facing lecturers who teach research methods at the undergraduate level are that class sizes are large and students are extremely anxious about their ability to learn the concepts and skills presented. After examining the 2003 Student Evaluation of Teaching Questionnaires (SETs) for Basics of Behavioural Research (PSYC 1103), it was clear that students wanted more feedback on their assignments in order to facilitate their learning. It was also evident that many students found the lecturer's use of multiple explanations for the same concept confusing while others found them too easy to follow. Thus, the problem we encountered was twofold: (1) we needed to provide students with detailed, tailored feedback and (2) we needed to accommodate diverse learning styles while providing the means to develop a deeper level of understanding of the skills required for methodologies and statistics in Psychology. In addition, these needs had to be addressed in an efficient manner and within a set budget, while still addressing the needs of a large group of individual students. A collaborative learning and assessment strategy, grounded in the current literature, was developed in an attempt to address these issues.

The decision to alter the curriculum design for 2004 was not taken lightly. While research suggests that students who engage in collaborative learning in authentic assessment tasks achieve better learning outcomes than those who do not, (Atherton, 2004; Clarke, Pearce, & Gannaway, 2004; Heathfield, 1999; Johnson, Johnson, & Smith, 1998), students frequently report a dislike for "group work" (Bacon, Stewart, & Silver, 1999; Dyrud, 2001).

Action research activities have suggested that there are mechanisms that can be used to avoid problems frequently associated with group-based assessment (Bacon et al., 1999; Foley, 1999; Guerin, 1999) to facilitate a mutually advantageous peer supported learning environment.

The following is a report on the outcomes of an investigation designed to examine the efficacy of this learning approach.

The Context

'Basics of Behavioural Research' is a first year compulsory topic in the School of Psychology at Flinders University. The class is comprised of first-year Bachelor of Behavioural Science or Bachelor of Psychology (Honours) students. In 2004, this class consisted of 140 students whose main demographic details are summarised in Table 1.

Table 1. Diversity of the class – demographic and educational background variables

Characteristics	Description	No. Students
Countries of origin:	Australia	138
	Poland	1
	USA	1
Gender	Female	114
	Male	26
Age (Range 17 - 54 yrs)	Number of students >25 years	39
Degree Programme	Bachelor of Behavioural Science	110
	Bachelor of Psychology (Honours)	30
Qualifications	Bachelor of Arts	1
	TAFE	2
Grade Point Average (Range 0- 7)	Highest	6.55
	Lowest	1.14

The Curriculum Design

The topic aims to extend and challenge students' learning in a supportive environment, with rich consequential feedback. The learning environment for the topic was structured on an experiential learning framework (Kolb, 1984), which enabled students to practice, then reflect and enhance their research skills. The process of actively practicing skills in their assignments in an interdependent environment prior to affirming their skills independently is also in keeping with Bigg's continuum of dependence/interdependence/independence (Biggs, 1999).

As group conflict often results from a lack of adequate training in team skills such as communication, role allocation and management strategies (Dyrud, 2001; McGrath, 2000; Vik, 2001), a conscious effort was made to design collaborative learning activities that focused not only on the academic content of the topic, but also attended to the social and inter-personal components of teamwork. The learning activities were also designed to provide opportunities for individual reflection and learning. Groups were assigned rather than self-selected (Fiechtner & Davis, 1985), trained in group dynamics to ensure communication skills, (Jaques, 2001) and allocated particular tasks.

The Assignments

This topic required students to complete four assignments: three in groups and one individual. Each assignment focused on the practice and development of specific skills required to carry out research effectively. The literature indicates that students learn from detailed feedback if it is made consequential and incremental (McCormack, 1995; Wiggins, 1998). Consequently, students received extensive written feedback on each assignment and were required to demonstrate (via a written paragraph) how feedback on previous assignments was incorporated into the current assignment (relevant to all assignments except the first one). Ultimately, the skills learned in these assignments were utilized and assessed simultaneously in one comprehensive assignment, carried out individually, due near the end of the semester.

For the first assignment, students were presented with brief abstracts of several studies. They were required to identify (1) the type of research design used in each study and (2) the variables under investigation in each study, at both a theoretical (i.e., description of the variable in the real world) and operational (i.e., description of the variable in the form specific to the study) level. The most challenging task faced by each group was distinguishing variables at theoretical and operational levels.

The second assignment required students to read a journal article in which students were asked to identify the same information they had identified in the previous assignment, as well as the purpose, hypotheses, and results of the research reported in the article. The most challenging task faced by each group in this assignment was learning how to identify the variables under investigation within the context of a journal article.

The final group assignment provided students with five general research questions typical of those asked in psychology, three of which were amenable to investigation using non-experimental research designs. Students were challenged to determine which of the three research problems could be investigated using a non-experimental design and were then asked to briefly describe a non-experimental study that would assess this problem. This latter task required them to identify all of the components of a research study as assessed in assignment 2 (except the results), describe the population from which they would draw their sample and an overview of their procedure. The final assignment in this topic (carried out individually) was identical to the final group assignment, carried out within the context of an experimental research design.

Groups were provided with a folder in which their portfolio of work could be stored and which was submitted for marking.

Allocation to Groups

Students were randomly assigned to groups of 4 – 6 by the instructor. Mature age, Bachelor of Psychology (Honours), and the two English-as -second-language students were equally distributed among groups. Prior to the introduction of the group assignments, class time was provided for students to meet the members of their group and complete a “getting to know each other exercise” (Morgan, 2002, p. 65) which asked students about their like and dislike of teamwork and their abilities. In addition, each group was asked to complete a group ‘charter’ (Morgan, 2002, p. 71) that delineated the manner in which the group would function (i.e., regularity, length, and location of meetings; management of group conflict, etc.). Each member of the group signed the charter and it was placed in the group portfolio for submission with the group assignments. Finally, groups were asked to engage in an in-class team-building exercise (i.e., building a free-standing tower using 30 plastic straws and tape; (Morgan, 2002, p. 76), as an ice breaker.

Roles within Groups

All students were provided with a handbook outlining (1) the roles within groups (2) useful strategies for forming a cohesive group (3) behaviours that undermine the effectiveness of group work and (4) potential areas of conflict and strategies for conflict management. For each assignment, group members were required to take on one of the roles described below, as recommended by Mello (1993) and Feichtner and Davis (1985). These roles were rotated for each assignment—no one individual was allowed to serve in the same role twice.

Facilitator. The Facilitator ensured the group stayed on task and worked on time; encouraged participation of all group members; tracked how well the group was cooperating; encouraged discussion of conflicts; ensured all members had an accurate understanding of how answers to assignment questions were arrived at.

Recorder. The Recorder recorded the group's decisions; made notes at meetings; completed the Assignment Information Sheet (identified the student in each role for each assignment); communicated with the Lecturer or Teaching Assistant if questions arose; ensured all members received a copy of the feedback given for the previous assignment.

Summariser. The Summariser produced the final product in a typewritten format; in conjunction with the Editor, ensured that the final product was peer reviewed once prior to being submitted; ensured all members received a copy of the submitted assignment, kept track of the group portfolio.

Editor. The Editor peer reviewed the final product, as produced by the Summariser, prior to the final copy of the assignment being handed in; reviewed the final product in a timely fashion to ensure the Summariser had adequate time to make changes prior to the due date of the assignment; completed the Feedback Incorporation Sheet (detailing how feedback from previous assignments was incorporated into current assignments).

In groups with more than 4 members, one or both (as necessary) of the following roles were utilized:

Enabler. The enabler encouraged group co-operation; ensured all members had an equal opportunity to contribute; facilitated conflict management (as necessary). Note: this role reduced the role requirements for the Facilitator.

Administrator. The Administrator ensured all members had copies of the feedback given to previous assignments; ensured all members had copies of the current assignment (upon completion); completed the Assignment Information Sheet and Feedback Information Sheet. Note: this role reduced the role requirements for the Recorder, Summariser, and Editor.

Assessment and Marking Scheme

A component of the overall grade for this topic was allocated to student perceptions of group participation. Thus, each student graded the relative contributions of their peers to the group. These marks were used by the lecturer, in conjunction with marks he or she allocated to tutorial attendance and tutorial participation (i.e. marks given by tutorial leaders based on the extent to which students actively engaged in the tutorial activities), to calculate each student's final group participation mark.

The weighting of the marking scheme for the topic varied in order to alleviate student concerns of the potential for being allocated to a "poor" group. In Marking Scheme One, group assignments were weighted more heavily than the cumulative individual assignment due at the end of the semester. In Marking Scheme Two, this was reversed. The marking scheme producing the most favourable grade for each student was used to calculate her or his final grades. All final grades were calculated using Marking Scheme One.

Data Collection

Prior to completion of the first group assignment (Time 1 is approximately $\frac{1}{4}$ of the way into the semester) students' attitudes towards the collaborative learning strategy was assessed via a questionnaire containing 15 statements reflecting potential thoughts and feelings about group work. Students were asked to rate the extent to which they agreed with each statement using a 7-point Likert scale with 1 being "strongly disagree" to 7 "strongly agree". Some items on this questionnaire were adapted from a published team-review exercise (Morgan, 2002, p. 81) while others were generated based on the lecturers' prior experience with student reactions to group work. In addition, students were asked to identify one thing that they thought would be

most advantageous and one thing they thought would be most disadvantageous about working in groups. Upon completion of all group assignments, this questionnaire was completed again (Time 2 is near the end of the semester). Questionnaires were completed during regular class time at both Time 1 and Time 2. A total of 92 students returned questionnaires from both Time 1 and Time 2.

Results

Quantitative Measures

One-way repeated measures Analyses of Variance, with Time (1 versus 2) were carried out on ratings of students' attitudes about group work. As can be seen from Table 2 below, students' attitudes towards group work were significantly more positive after the collaborative learning experience provided in this topic.

Table 2. Means and standard errors on statements reflecting attitudes toward group work as a function of time.

No.	Statement	Time 1	Time 2
1.	I prefer to complete assignments on my own.	5.74 (.18)	4.78 (.15)*
2.	Groups are unproductive because "being friends" or "being nice to each other" often hinders productivity.	3.71 (.16)	3.17 (.15)*
3.	Groups facilitate learning because of the sharing of ideas, skills, and resources.	5.35 (.12)	5.62 (.10)*
4.	Successful groups are those that are committed to achieving the goal at hand.	6.28 (.09)	6.31 (.10)
5.	I learn more effectively when working on my own than when working with others.	4.67 (.15)	4.51 (.14)
6.	I don't like to be dependent on others for getting assignments completed or handed in on time.	6.12 (.10)	5.5 (.13)*
7.	The quality of work produced in groups is superior to the work I would produce alone.	3.27 (.11)	3.80 (.15)*
8.	When I work in a group, I end up doing more than my fair share of work.	4.53 (.11)	3.98 (.14)*
9.	Our group meetings were effective.	5.06 (.12)	5.85 (.10)*
10.	My group communicated well.	5.17 (.11)	5.82 (.12)*
11.	The members of my group participated equally.	5.03 (.14)	4.92 (.20)
12.	The members of my group shared the workload equally.	5.05 (.15)	4.97 (.19)
13.	Overall, I think that completing group assignments has resulted in a better grade for work than I would otherwise have achieved.	3.70 (.13)	4.40 (.14)*
14.	Overall, I found working in groups in this topic to be a positive experience.	4.82 (.13)	5.53 (.12)*
15.	In general, I like group work.	3.98 (.16)	4.71 (.14)*

* Mean responses between Time 1 and Time 2 are significantly different; $p < .05$.

Note. Wording for Items 9 – 14 varied slightly from Time 1 to Time 2 such that Time 1 items were worded in a manner designed to assess students' expectations while Time 2 items were worded in a manner designed to assess students' actual experiences.

Qualitative Measures

At both Time 1 and Time 2 students were asked to identify one thing that was most advantageous and one thing that was most disadvantageous about group work (Note: many students identified more than one item). Two independent raters, blind to the aims of the study, separately reviewed these data and identified the common themes in these responses. The raters then met and resolved any discrepancies between their coding schemes until one

agreed upon coding scheme was reached. All data were then coded for these themes by one rater; 25% of the data were coded by the 2nd rater—inter-rater agreement was 94%.

Table 3: The 4 most common items listed as advantages and disadvantages at Time 1 (as reflected by % of students responses identifying them) and the % of students who identified these same themes at Time 2.

Themes	Time 1	Time 2
Advantages		
Sharing Ideas; skills/knowledge; resources; workload/responsibility	84.04	85.11
Social Meeting new people; enjoyment; support; increased confidence	56.38	10.64
Learning Ideas; skills; understanding; communication; critical feedback	40.33	36.17
Better Final Product	6.38	5.32
Disadvantages		
Organisation Meeting times; different approaches/standards; decisions/ideas	48.94	52.13
Inequality in Workload/Effort	45.74	34.04
Social Difficulties Dominance of 1 person; unpleasant; meeting new people; personality clashes; distraction by others; communication	35.11	19.11
Dependence on Others Lack of individual control/comprise; lack of trust/anxiety; time coordination/obligation; grades/different abilities	21.28	42.55

As can be seen from Table 3, the most common advantage of group work, as identified by students at both Time 1 and Time 2 was the sharing of ideas, skills, resources, workload and responsibility. Interestingly, the social advantages of group work, as identified at Time 1, were infrequently identified as advantages at Time 2.

In contrast, the most commonly identified disadvantage of group work, at both Time 1 and Time 2 were items related to organisation—i.e., coordinating meeting times, dealing with individuals' different approaches and standards toward assignments and making decisions relating to the content of the assignments. Despite this result, these data also illustrate that after completion of the group assignments, fewer individuals identified social difficulties as a disadvantage of group work. Further examination of these data illustrate that at Time 2, individuals were more likely to identify dependence on others as a disadvantage of group work. Closer inspection of this theme revealed that this increase was primarily due to an increase in the number of individuals identifying lack of trust/feelings of anxiety related to other group members completing their portion of the work effectively and efficiently, and having to depend on someone else to hand the assignment in on time.

Comparison of Students in 2004 to those in 2003

In order to examine the overall effectiveness of the collaborative learning strategy utilised in 2004, final grades in 2004 were compared to those of students in 2003. This was performed because students in 2003 completed assignments identical (in terms of skills assessed and difficulty level) to those completed in 2004 except that all assignments were completed individually in 2003. Although the 2003 class obviously comprised different students from those enrolled in 2004, the classes were quite similar in terms of class size, the number of mature age students, and the minimum Tertiary Entry Rank (percentile rank system used in South Australia to determine entry into University degrees) required to gain entry into the Bachelor of Behavioural Science and Bachelor of Psychology (Honours) degrees, making this a reasonable and valid comparison (see Table 4).

A one-way analysis of variance carried out on students' final grades indicate that students in 2004, who were exposed to a collaborative learning environment, did significantly better than those in 2003 $F(1, 288) = 12.93, p < .01$.

Table 4. Comparison of Students in 2004 to those in 2003.

Characteristics	2004	2003
Number of Students	140 (26 Males)	150 (40 Males)
> 25	39 (Range 17 - 54)	44 (Range 18 - 65)
Incoming Minimum Tertiary Entry Rank		
Bachelor of Behavioural Science	83.55	85.9
Bachelor of Psychology (Honours)	93.45	95.8
Final Grades		
Average	74	64
Highest	89	90
Lowest	30	28
No. of Fails (<50)	6	7
No. of Passes (50 – 64)	40	38
No. of Credits (65 – 74)	9	60
No. of Distinctions (75 – 84)	69	40
No. of High Distinctions (85 – 100)	16	6

Discussion

The collaborative learning strategy utilised in this study clearly facilitated an interdependent and active learning strategy. The gains made in this topic by using this approach, particularly in terms of student learning, far exceeded our initial expectations. First, many students reported more positive attitudes towards group work after having completed the group assignments. Second, the experience of being in a team and the ability to work in one, though not assessed in the present study, is a valuable and practical skill that can be applied to many situations (e.g., community service, as a student, as a lecturer, in most, if not all future employment environments). Finally, the improvement in final grades suggests that, at least while the class was being taught, the collaborative learning strategy did facilitate student learning, as evidenced by a 10% increase in the final grades (almost entirely due to the fact that there was a 100% increase in the number of students who obtained distinctions and high distinctions).

In terms of the feedback issue identified in the 2003 SETs for Basics of Behavioural Research, using this strategy allowed us to provide each group with at least 1 page of detailed feedback with respect to each assignment. As educators, we are extremely satisfied with the level of feedback we were able to provide - a significant improvement in the quality of feedback received. Further support for this assertion comes from the 2004 SETs for Basics of Behavioural Research -- only one student thought that the feedback should be more detailed, suggesting that most students were quite satisfied with this aspect of the topic.

This innovation further freed up much of the part-time teaching budget in this topic so that more funds were allocated to writing detailed feedback for each of the collaborative assignments. Since students often make the same mistakes from year to year in this topic, the detailed feedback comments for each assignment were entered into a database for use in this topic in the future, since the concepts and skills being taught will be unchanged.

Overall, the success of the collaborative learning strategy utilised in the present study is a result of multiple factors including: the organisation and structure (i.e., roles within groups) provided to the groups, the cumulative nature of the assignments, and the requirement that groups had to demonstrate that the detailed feedback received on assignments was incorporated into future assignments. As educators, we are extremely satisfied with the

success of this approach and though this approach will be retained, we will continue to engage in strategies designed to enhance the efficacy of this approach.

Notes on Contributors

Yolanda Martins is a lecturer in the School of Psychology at Flinders University. She is the instructor for Basics of Behavioural Research, the topic that this collaborative learning strategy was trialled and evaluated in. She co-designed the collaborative learning strategy, co-designed the investigation to examine the efficacy of the collaborative learning strategy, carried out analyses on the data collected and contributed to the writing of this manuscript.

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