Aligning assessment, rewards, behaviours and outcomes in group learning tasks

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Academics often use group learning tasks to enhance educational outcomes in the classroom and laboratory setting. Quite often, however, the group learning task goes awry and the intended benefits of the experience do not occur. Failure to understand how assessment, reward and group behaviour constructively align to the learning outcomes is often the cause of the groups' dysfunction. This purpose of this paper is to illustrate the principle of constructive alignment. Examples from two programs are provided where constructive alignment principles were applied. In the first example, undergraduate physiotherapy students practiced their clinical assessment and reasoning skills in a paired group task. In the second example, post-graduate business students worked on their leadership skills in a paired group task. The physiotherapy students gained statistically significant better outcomes from the group experience in comparison to their peers who worked individually. This stemmed, in part, from the constructive alignment principles embedded into the learning plan. The postgraduate business students also reported noteworthy educational achievements from their group experience, again, illustrating the importance of ensuring constructive alignment principles are embedded into the unit's design. The results of this evaluation suggest that academics can be more strategic about ensuring high quality learning outcomes from the group experience by paying careful attention to assessment, rewards and desired group behaviour in line with the stated learning outcomes.

Introduction

Academics often use group learning tasks to enhance educational outcomes. Group learning tasks are defined as groups of two or more students working together on a common assessment task where all are accountable for the group's success (Kagan, 1994). Quite often, however, the group learning task goes awry and the intended benefits of the experience do not occur. Failure to understand how assessment, rewards and group behaviour all influence the proposed learning outcomes is often the cause of the groups' dysfunction. Understanding how assessment, reward and student behaviour are directly linked to learning outcomes will enable academics to be more effective about the design of their educational initiatives.

This integration of assessment, reward and student behaviour towards learning outcomes has been described by Biggs (2003) as 'constructive alignment'. Constructive alignment is based on students' constructing meaning through the learning activities that are set for them in their unit. In other words, how do students view the interrelationship between assessment, reward value and the effort and action they must exhibit in order to achieve the stated learning outcomes. If the assessment, rewards and required student behaviour are aligned with the learning outcomes, relevant learning will occur because these drivers push the students in the appropriate direction (Biggs, 2003).

The group learning experience that is used in this paper to illustrate the concept of constructive alignment involves pairs of students working together to achieve set learning outcomes. The nature of the paired interaction that is the focus of this paper is termed peer coaching (PC) and is defined as a method whereby individuals with equal status actively help and support each other in learning tasks (Topping & Ehly, 1998).

In order to illustrate the concept of constructive alignment and how assessment and reward influence student action it is important to consider three types of student learning behaviour: cooperative, competitive and individualistic.

Being able to work cooperatively within a team is touted as a necessity for today's University graduate. Hence, the purpose of many group learning activities is to provide students with the experience of working in a team. The group learning experience, which requires cooperative behaviour, can be an excellent strategy for increasing educational outcomes (Greenwood, Carta, & Kamps, 1990; Johnson, Johnson, & Smith, 1998; Ladyshewsky, 1999a; Ravenscroft, 1997; Slavin, 1990a, 1990b; Topping & Ehly, 1998). It is one of the most well-researched and accepted curricular innovations in practice (Antil, Jenkins, & Wayne, 1998; Johnson, Johnson, & Smith, 1998).

At the tertiary level, however, there is not the same degree of consensus that group work benefits all learners (Hampton & Grudnitski, 1996; Slavin, 1990b). While many studies and reviews of cooperative learning have demonstrated increased academic achievement in tertiary level learners (Cook, 1991; Goldschmid & Goldschmid, 1976; Hampton & Grudnitski, 1996; Holt, Michael, & Godfrey, 1997; Johnson, Johnson, & Smith, 1998; Ladyshewsky, 1999a; Ladyshewsky, Baker, & Jones, 2001; Milson & Laatsch, 1996; Riggio, Fantuzzo, Connelly, & Dimeff, 1991; Riggio, Whatley, & Neale, 1994; Topping, 1996) critics argue that many of these studies and reviews are descriptive and rarely use experimental methods (Currens & Bithell, 2003; Hill, Gay, & Topping, 1998; Lindquist, 1997; McAllister & Osborne, 1997; Rizzolo, 1982; Sullivan, 1996; Topping et al., 1997).

Johnson, Johnson and Smith, (1998) however, comment on over 300 studies which have examined cooperative learning, individual learning and competitive learning situations in college and adult education settings. With respect to academic success, their meta-analyses of 168 studies over the past 70 years demonstrate that cooperative learning methods promote higher achievement than competitive approaches and individual approaches with effect size differences of 0.49 and 0.53 respectively. These effect sizes describe significant increases in achievement in the areas of knowledge acquisition, retention, accuracy, creativity in problem solving and higher level reasoning. The quality of social support in the learning relationship is also greater in cooperative learning than in competitive learning and individualistic learning with effect sizes of 0.60 and 0.51 respectively. Cooperative learning is also able to promote higher self-esteem than competitive learning and individual learning with effect sizes of 0.47 and 0.29 respectively. Hence, while there is ample support for the benefits of cooperative or group work, simply assigning two or more learners to work together does not necessarily mean the experience will be successful (Volet, 1991).

For group learning outcomes to be successful, an understanding of how rewards influence action is necessary (Johnson & Johnson, 1991; Slavin, 1990a, 1991). These reward structures influence the cognitive and affective outcomes of learning by creating either cooperative, competitive, or individualistic behaviour and the resultant outcomes of the group experience.

Cooperative behaviour will only occur when learners realise that the only way to achieve their reward or goal is to ensure that the group overall receives its reward or goal (Caspersz, Skene, & Wu, 2005). In this situation, goal achievement is interdependent. It is the establishment of this cooperative reward structure through the established assessment tasks that the instructor "regulates learners' willingness to learn, and their motivation for their intensity and way of learning" (Vedder & Veendrick, 2003).

Several hypothetical examples are provided to illustrate this example.

1. In the health education fieldwork setting where two students work together one of the students provides coaching to his learning partner. This feedback enhances the learning partner's performance and reinforces the importance of this skill in the giver of this feedback. The reward or goal that drives cooperation is inherent in the patient (whom the students share) receiving a high quality intervention, and the positive feedback received from the appreciative client. The instructor also rewards the students for achieving this goal by providing each participant with positive feedback, a good grade and/or supporting comments in the students' evaluation form for cooperative behaviour. Working together pays off and rewards are received at the individual and team level.
2. In the laboratory setting, students work in triads. Each week students must practise their specific laboratory exercises and skills. There are also a series of random quizzes which evaluate the students' laboratory knowledge and skill. The results of each random quiz are collated and the grade the triad receives is the mean of each person's quiz result within the triad. Students coach, instruct, and test each others' knowledge to ensure everyone in group fully understands the laboratory exercises, in order to achieve a good grade for the group. The reward

system drives learner engagement towards cooperation to maximise learning outcomes.

3. Students in a leadership course set personal objectives to be achieved in the workplace. They maintain reflective journals on their progress and work with a peer coach in their class. Both support each other towards achieving their objectives and share their insights from their learning journals. At the end of the exercise they submit a learning outcomes and coaching report which requires them to comment and provide evidence on their progress towards achieving their stated learning outcomes and the coaching experience for 25% of their personal grade. Without investing in the coaching experience, neither can maximise the possibility of getting a good grade. In this case, the grade (or reward) becomes the driver to engage the students in a cooperative learning venture.

A competitive reward structure, in contrast, exists when learners perceive they can only achieve their personal goal at the expense of the group achieving its goal. When this reward structure is in operation, learners will be working at odds with one another. Two examples are provided to illustrate what causes competitive behaviour and leads to the failure of well-intended group learning experiences.

1. In the fieldwork that was described earlier, one of the students withholds valuable feedback from her learning partner. This information is used by the withholder of the feedback to improve their performance, in comparison to their peer, so that they get a better evaluation from their instructor. The instructor unwittingly reinforces this competition by not monitoring the groups' performance. If the other student becomes aware of this withholding, trust is breached, and they in turn retaliate with competitive behaviour by not providing their partner with valuable feedback. By not monitoring the learning situation and being strategic about the reward systems, increasing competition develops between the learners.
2. In the laboratory example noted above, if the quiz results are not averaged for the triad, students may withhold information from the triad in order to gain a competitive advantage over the members of their team. There is no incentive to encourage cooperation because the assessment strategy rewards competition. Students spend less time on coaching and practicing their skills and become more focussed on competitive or individualistic behaviour in order to maximise personal rewards.

An individualistic reward structure exists when learners realise that the achievement of the individual's goal is unrelated to the goal achievement of the group. For example, if the grade allocated to a group project is small relative to other assessment, students may contribute the minimum towards the task. Learning energy will be focussed on individual efforts in assessment that has a greater weighting and must be done independently. Their contribution to the group takes on a minimalist approach and the work that is submitted may be superficial because the assessment structure of the unit is rewarding individualistic effort. An example is provided to illustrate this principle.

The students in the leadership course noted above are put into the same learning experience as described above. However, the coaching experience is only worth 10 or 15 per cent of the overall unit grade. The time investment for coaching for the small grade allocation is not worth the effort for the student and they put the bulk of their energy into their individualistic study and other assignments. Learners migrate to a more individualistic approach to their learning and do not gain value by working with their peers because the reward negates the value of the learning experience.

What processes, therefore, are needed to encourage cooperative learning outcomes during the group experience? Johnson and Johnson, (1991) and Johnson, Johnson and Smith, (1998) describe several elements for successful cooperative learning. These elements help us to understand more deeply the principles that encourage cooperation. These elements are: preparation of learners' interpersonal and small group skills; reflection on, and evaluation of, group processing; positive interdependence; and individual accountability. The last two points are particularly significant as they describe the interdependence of the reward on all group members and the individual action one must take within the group to achieve the stated rewards or goals.

There is ample evidence suggesting that educators need to consider these elements in the design and delivery of their assessment practices to maximize learning outcomes (Vedder & Veendrick, 2003). Qin, Johnson and Johnson (1995) examined intra-group cooperation versus individual competition in a meta-analysis of 46 studies. Cooperative teams generally outperformed individuals competing with one another, with effect sizes ranging from 0.55 to 0.60 reported

in the literature. In another review of the literature, Slavin (1983) noted that 87.5 per cent of studies which employed group goals and individual accountability reported statistically significant positive effects on learner achievement. Having learners merely work together, without these structural factors, did not necessarily lead to enhanced learner achievement. Vedder and Veendrick (2003) also note that in simple task structures where learners attach personal significance to the task, intrinsic motivation is generally high and the presence or absence of cooperative reward structures are less critical in driving achievement. However, where task structure is complex, which is often the case in project work, the reward structure must be considered carefully as well as the ability of the learners to actually work through the challenge (Vedder & Veendrick, 2003).

Learners also need to understand basic group processes such as leadership, conflict management and decision making (Cinelli, Wolford-Symons, Bechtel, & Rose-Colley, 1994). Self-assessment, communication skills, ability to give and receive feedback and problem solving skills are other attributes students need to develop (Davis, 1998; Gandy & Jensen, 1992; Hunt & Higgs, 1999). Because feedback is such a central part of learning in a team, learners also must understand how to deliver this feedback in a non-evaluative manner. Joyce and Showers (1995) state that feedback is difficult to administer in a group as it often becomes evaluative and negatively influences the experience. Learners need to understand how to provide non-evaluative feedback (Ackland, 1991; Showers, 1984; Skinner & Welch, 1996) otherwise their partners may withdraw into more individualistic practice because of the status differences that emerge which destroy solidarity. Non-evaluative feedback preserves the integrity of the relationship and builds trust (Ackland, 1991).

Constructive alignment of assessment, rewards and student action to learning outcomes

a. Developing clinical investigation skills in physiotherapy students.

Sixty two undergraduate physiotherapy students were participating in a unit that required them to develop their clinical interviewing and assessment skills. Students in this unit were required to assess a simulated patient (Ladyshewsky, 1999b; Ladyshewsky, Baker, Jones, & Nelson, 2000) who was facing significant unemployment as a result of a shoulder problem. The students were required to conduct a complete patient history and physical examination and then complete a clinical reasoning test (CRT) measuring their knowledge of the patient's medical and psychosocial history, physical condition, and management requirements. One cohort of students undertook this assessment individually (n =20) and completed the CRT independently. Hence, this task encouraged an individualistic approach. Another cohort undertook this assessment as a pair (n = 21 pairs). In the paired situation, students assessed the patient collectively but then wrote the CRT independently. However, the results of these students' clinical reasoning tests were averaged for the pair and each received the mean result as their grade for that assignment. This assignment was worth 25 per cent of the overall unit grade for both the individual and paired cohorts.

The reward was significant (25 percent and doing a good job in front of the client) and was aligned strategically to the assessment activity. The activity promoted cooperative behaviour because of the shared CRT result the pair had to generate. This alignment encouraged students to engage with the learning task and work cooperatively towards the learning outcomes. The achievement of learning outcomes for the cohort of students who worked in pairs was also significantly better than that for the cohort of students who worked independently. Constructive alignment lead to better achievement of the learning outcomes. A comprehensive description of this study and the psychometrics of the instruments and simulated patient can be found in (Ladyshewsky, 2002, 2004).

Table 1 illustrates the outcomes measures for the individual and paired group with respect to scores obtained on the HC (history checklist), PEC (physical examination checklist), and the ACIRS (Arizona Clinical Interview Rating Scale). The HC and PEC itemise the criteria expected of the students in completing a history and physical examination. Scoring is on three levels with 0 (not done), 1 (partially), and 2 (completely). The ACIRS itemizes a series of interview protocols demonstrating good interview practice. It was modified for this study as it was originally designed for medical students. It was also scored on a 0, 1, 2 scale in this study. The maximum score participants could achieve on each scale is identified in the max score column. Students in the paired group obtained higher scores on all measures. The standard deviations of the paired group across all categories also demonstrated lower variance. The data in Table 1 reveals a moderate effect size for the HC (0.51), in favour of the paired group. The other

categories demonstrate moderate to strong effect sizes in favour of the paired group (0.67 to 0.82).

Task	Max Score	Individual (n=20)		Paired (n=21)		Effect Size	t value
		Mean	S.D.	Mean	S.D.		
HC	48	32.05	5.49	34.48	3.83	0.51	-1.65
PEC	40	23.15	6.72	28.14	5.43	0.76	-2.62*
ACIRS	24	19.45	2.67	21.05	1.83	0.67	-2.23*
CRT	88	55.20	9.98	62.62	7.11	0.80	-2.75*
Total Score	112	74.65	11.52	83.67	8.62	0.82	-2.85*

=p<.05

Table 1: Independent samples t-tests for history, physical examination and communication scores between the individual and paired groups

The effect size indicator is a simple means analysis and is recommended where one group of subjects receives a given intervention and another group does not receive this intervention (Glass, McGaw, & Smith, 1981; Nelson, 1981). The effect-size method evaluates the difference between the means of pairs of treatment conditions divided by the composite group standard deviation thus yielding a standardized mean difference.

The trend for higher scores in the paired group was statistically significant across all categories (with the exception of the HC): PEC ($t = 2.62$; $df = 39$; $p<.05$); ACIRS ($t = 2.23$; $df = 39$; $p<.05$); HC+PEC ($t = 2.75$; $df = 39$; $p<.05$); and total score ($t = 2.85$; $df = 39$; $p<.05$).

Outcome measures for the individual and paired groups with respect to the CRT are depicted in Table 2. The CRT was developed using an extended matching multiple choice format described in the literature (Page, Bordage, & Allen, 1995). This format asks the student to identify their underlying reasons for their clinical decisions. Students identify their reasons from a menu of 15 items for each CRT question. Five of the reasons are incorrect and are each worth zero. Another five reasons are plausible but not the best fit and are each worth one. The five remaining reasons are most appropriate and each are worth two. The maximum score they could obtain for each component of the CRT is listed in the max score column. For the most part, the mean scores of the paired group were higher in comparison to the individual group. The paired group score was derived by adding the individual CRT score of the two parties and using their mean as their graded score. Only the history question scores demonstrated little differentiation between the two groups. This lack of differentiation likely stems from the fact that all students used a history question template as part of the assessment.

Small to moderate positive effect sizes were seen for the paired group on the diagnosis (0.43) and physical examination questions (0.32) of the clinical reasoning test. A strong positive effect size was evident in favour of the paired group on the management questions (0.85). A moderate to strong positive effect size for the paired group occurred for the overall CRT score (0.69). While the paired group generally did better on the overall CRT, statistically significant differences were only evident for the management section ($t = 3.38$; $df = 60$; $p<.05$) and the total clinical reasoning test ($t = 2.66$; $df = 60$; $p<.05$).

Items	Max Score	Individual (n=20)		Paired (n=42)		Effect Size	t value
		Mean	S.D.	Mean	S.D.		
Diagnosis	18	6.30	2.45	7.17	1.72	0.43	-1.61
Management	20	6.00	1.79	7.88	2.16	0.85	-3.38*
History Key Features	20	15.70	1.26	15.62	1.59	-0.05	0.20
Phys. Exam. Key Feat.	30	22.05	3.00	22.83	2.15	0.32	-1.18
Total CRT Score	88	50.05	5.95	53.50	4.13	0.69	-2.66*

Table 2: Independent samples t-test for outcome scores on the CRT for the individual and paired group

b. Leadership skill development in post-graduate business students

Forty-five post graduate business students who were enrolled in a unit designed to develop leadership skills worked as a coaching pair to promote transfer of academic content into work place practice. Students were required to put together a leadership development plan for a specific skill and practise it over eight weeks in the workplace, with the support of a peer coach from the class. The coaching was reciprocal. The coaching component of the unit was worth 20 per cent of the overall unit and was aligned with learning outcomes of leadership development and coaching skill. Students had to report (in writing) on their learning outcomes and how the coaching process influenced learning. Constructive alignment was achieved by aligning the assessment activity to the learning outcome and creating a cooperative reward system that encouraged the learners to engage with one another. Failure to engage, for example, by resorting to individualistic or competitive behaviour would prevent them from completing the assignment and thus jeopardising the 20 per cent grade for both parties.

The students' assignments were examined to assess the impact of the peer coaching experience on their learning. The assignments were analysed qualitatively using nVIVO and were coded thematically to determine how effective the constructive alignment strategy had worked. A more comprehensive overview of this research can be found in (Ladyshewsky & Ryan, 2006). Students reported numerous positive outcomes from the learning experience suggesting that the constructive alignment had produced a positive result. Several of the comments from the participants illustrate this principle.

> *"I found that through my role of peer coach to John (fictitious name) I was able to use the skills that I developed to assist me in other parts of my role as a manager. For example, I was able to improve the quality of feedback that I give my subordinates on their project work through asking open ended questions, actively listening, paraphrasing and initiating action on their concerns."*
>
> *"The peer coaching experience provided a focus for achieving my learning objective. It gave me a medium for investigating different scenarios and different ways of approaching the management of staff performance."*
>
> *"Through deeper and more critical thinking, I am able to expand and refine my knowledge in program development areas. Peer coaching enables me to set aside time and talk about specific learning objective areas. I was able to source fresh ideas from peer coaching. "*
>
> *"To me peer coaching was one of the most valuable learning experiences I have undertaken. In reflection, through reviewing my learning journal entries I was able to understand how, through working with John (fictitious name), my peer coach, I had endeavored to achieve my learning objective."*

Discussion

Constructive alignment was demonstrated in both examples in this paper and yielded extremely positive results. This suggests that when this principle is adhered to, one can expect positive outcomes from the learning experience. In order to apply this principle the first step involves being very clear about the intended learning outcomes. For the physiotherapy students the learning outcomes were developing clinical assessment skills and reasoning, and using peer coaching to enhance learning and performance. With these outcomes in mind, a simulated patient was chosen as the assessment task to achieve these outcomes. A variety of measures such as checklists and a clinical reasoning test to assess performance were put in place. The reward for good performance was significant (25 percent) and could only be maximised by engaging in cooperative behaviour with the other learner. By linking the reward in an interdependent manner through averaging the results of the two clinical reasoning tests, learner behaviour was influenced directly in a cooperative manner. This cooperative strategy engaged the students more fully in the experience and led to their higher level of achievement with respect to the learning outcomes.

In the management example, the learning outcome was to have students experience a leadership development exercise which involved goal setting, journaling and coaching with the ultimate aim of producing a change in leadership behaviour. With this outcome in mind, the assessment entailed putting together a leadership development plan. This

plan had to be implemented over the course of 8 weeks with reflective journaling and coaching taking place to help assist with goal achievement. Learners had to practise developing their leadership skills. The reward was significant (20 percent) and could only be achieved through cooperative behaviour, namely, coaching one another. Without engaging in the coaching experience, it would have been difficult to write the learning outcomes and coaching report. The reward and assessment structure therefore appeared to have influenced student engagement and cooperative behaviour positively. The levels of achievement of the learning outcomes reported by these students were excellent. The positive engagement of the students may also be explained, however, by the content of the unit and the quality of instruction. Students enjoy the unit content and the instruction is also highly regarded. These may also positively influence student motivation to learn and achieve.

Using a grade as a reward requires some consideration. A grade worth 20 – 25 per cent appeared to be significant enough to engage learners in cooperative behaviour. A value of this percentage is enough to make a difference between receiving a credit versus a distinction for a unit.

By considering assessment, reward, learner behaviour and learning outcomes, academic staff can be more strategic about planning their group learning experiences. The research is quite clear about the benefits of cooperative learning on achievement so it is a worthwhile strategy to pursue in the educational setting. In the examples provided above, when constructive alignment is carefully considered, it is possible to elevate performance towards the achievement of learning outcomes in group assignments.

All too often, however, group learning experiences suffer because of participants disengaging, competing or working individually. Part of this may be due to poor group processing and team work skills as noted earlier. If this is the case, learners must be given some training to work more successfully in groups. However, when these skills are present and the collective behaviour of the group does not move in a cooperative direction it may be worth exploring whether this failure may be attributed to the lack of constructive alignment in the unit structure.

Conclusion

When assessment, rewards and learner behaviour are aligned with the learning outcomes of a unit, positive group work experiences are more likely to occur. Academic staff should adopt these instructional design strategies to strengthen the quality outcomes of their unit.

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