An investigation of the motivational aspects of peer and self-assessment tasks to enhance teamwork outcomes

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Teamwork and cooperative learning models are based on the premise that learning is best achieved interactively rather than through a one-way transmission process. In this study, the relationship between students' motivational orientation and the quality of learning in collaborative teams is investigated. A self-report measure of student self-efficacy and self-regulation was administered to students working on team-based assessment tasks, and correlated with performance data obtained from classroom assignments. The results showed that motivational beliefs were the best predictor of academic performance.

Keywords: Teamwork, motivation, self regulated learning, self and peer assessment

Introduction

While teamwork has always been part of university learning experience, this has often meant students simply interacting informally with each other outside formal teaching sessions. In more recent times, peer learning and peer assessment have been included as part of an organised learning experience with students being asked to work together to complete tasks and to engage in peer and self-assessment. For many students, this has meant moving beyond 'the comfort zone' of informal social interaction and taking on roles as peer assessors and collaborative, self-directed team members (Biggs, 1999; Boekaerts, 1997).

In addition, there is a growing emphasis in higher education institutions that students should be developing content knowledge as well as professional skills that can be directly applied in the workplace such as teamwork, problem solving skills, decision-making skills, communicative strategies and information literacy skills (Australian National Training Authority, 1998; Bennett, Dunne, & Carre, 1999; Candy, Crebert, & O'Leary, 1994; Dearing, 1997). Contemporary educational theory indicates that using self-regulation and self/peer assessment strategies in the learning settings are important elements needed to develop these skills (Boud, 1992; Loughram, 1996). These strategies in conjunction with online asynchronous communication tools can provide ideal motivational settings to help promote learning as well as professional skill development.

Peer review and self assessment tasks are alternative forms of assessment that involve individuals deciding what value their own, and each of their colleagues has contributed to a process or project, and enables students to engage in self-regulated activity. While positive finding have emerged from studies of peer assessment conducted in technology rich learning environments, there remains a need to investigate not only the cognitive aspects of such tasks and environments, rather than assuming that they provide optimal conditions for all learners (Jarvela, 1998). This study presents a teaching-learning environment that integrates teamwork with self/peer assessment strategies supported with an online application designed to motivate students and assist in supporting self-regulated learning. Two instruments are then used to assess students' metamotivational states (i.e. their awareness of their own goals, efficacy and motivational attitudes). Two major research questions are identified for investigation: First, whether there was a relationship between students' perceptions of teamwork and their performance on team assessment tasks, and second, whether there was any correlation between their motivational state and actual academic performance. In the investigation two questionnaires were designed to analyse the links between motivational orientation, impressions of teamwork and achievement scores.

Theoretical underpinnings of motivation and collaborative learning

Online collaborative learning is supported by sociocultural theory positing that an individual's cultural development appears twice and on two levels--first on the social, and later on the psychological level, first between people as an interpsychological experience, as an intrapsychological experience (Vygotsky, 1998; Bonk & King, 1998; Ge, Yamashiro & Lee, 2000)). In a learner-centered online collaborative environment, students work together to construct knowledge and negotiate meanings through group-based collaborative learning activities. Based on this theory assumptions can be drawn about collaborative learning and knowledge building, which require communication, collaboration and negotiation on the common ground of shared ideas, values and beliefs (Johnson & Johnson, 1996). Many recent practices have contributed to the growing body of knowledge on collaborative learning, for example, the use of online asynchronous environments for project and inquiry based learning (Collis, 1998). Harasim (1990) also emphasises that "team work enhances connectivity and socio-emotional engagement in the learning process, as well as creating an intellectual climate that encourages participation" (p.54). In other words, a well designed online environment is conducive to both learners' affective and cognitive development.

The literature also acknowledges that cognitive achievement and metacognitive strategies are not sufficient to promote student achievement, and that students must also be motivated to learn intentionally and in a self-regulated manner (Pintrich, 1989). Student motivation is underpinned by a number of theoretical models and theories. The most commonly applied is the expectancy value model of motivation (Schunk, 1994)). According to Pintrich & De Groot (1990), there are three motivational components that may be linked to the different models of self-regulated learning:

1. An expectancy component: this includes students' beliefs about their ability to perform a task
2. A value component: This includes students' goals and belief about the importance of the task
3. An affective component: This includes students' emotional reactions to the task.

Linking motivation with self and peer assessment

Peer assessment involves individuals deciding on what value each of their colleagues has contributed to a process or project. Topping (1998) describes peer assessment as: "an arrangement in which individuals consider the amount, level, value, worth, quality, or successfulness of the products or outcomes of learning of others of similar status" (p. 249). This view is also supported by Falchikov (1995) who defines peer assessment as a process were individuals rate their peers by agreeing on appropriate assessment criteria and then accurately apply the assessment.

A review of the literature on self and peer assessment indicates that in order to promote the development of these skills, the environment should be designed to encourage participants to:
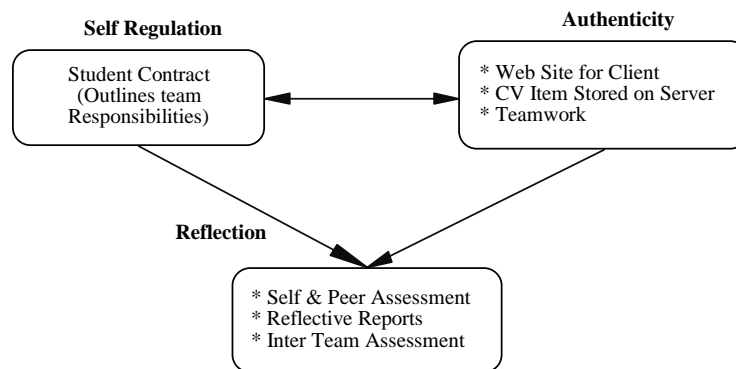
- Have a clear understanding of the objectives (Orsmond, Merry, & Reiling, 1996; Stefani, 1994);
- Identify valid assessment criteria (Falchikov, 1995; Ford, 1997; Klenowski, 1995; Sluijsmans, Dochy, & Moerkerke, 1999; Sullivan & Hall, 1997; Topping, Smith, & Swanson, 2000); and
- Accurately and objectively judge success or failure (Oldfield & MacAlpine, 1995; Woolhouse, 1999).
- Become self-regulated and self-motivated.

Self-assessment refers to people being involved in making judgements about their own learning and progress, which contributes to the development of autonomous, responsible and reflective individuals (Sambell, McDowell, & Brown, 1998; Schon, 1987). This is also supported by Boud (1992), who has expressed the defining characteristics of self-assessment as: "The involvement of students in identifying standards and/or criteria to apply to their work and making judgements about the extent to which they have met these criteria." (p. 5)

Both self and peer assessment can be used to help inform the design of the learning environment while building on motivational goals and improving self-regulation skills. The investigation centered on establishing links and possible correlations that might exist between achievement on the assessment tasks and the 3 motivational elements of assessment i.e., expectancy (self-efficacy beliefs), learners' goals and emotional reactions to the task.

Design of the learning environment

Learning activities were designed with a view to promoting self-regulation, team skills, social and peer accountability as well as reflection while working on authentic tasks (Figure 1). In week three of the semester, students were required to complete an online contract that outlined their responsibilities in the team. They then were able to complete confidential self and peer assessments about the progress of their peers, as stated on the contracts. These instructional strategies and tasks were designed to increase student motivation, self-efficacy and levels of self-regulation.

Self Regulation

Authenticity

Student Contract
(Outlines team
Responsibilities)

* Web Site for Client
* CV Item Stored on Server
* Teamwork

Reflection

* Self & Peer Assessment
* Reflective Reports
* Inter Team Assessment

Figure 1: Design of the learning environment

Context of the study

This study was conducted with a 34 final year students (making nine teams), enrolled in the Interactive Multimedia course at Edith Cowan University (IMM3330 'Industry Project Development'). Project work was used in this unit to help meet industry needs, as well as supporting the development of students' professional skills (Collis, 1998; Klemm & Snell, 1996; English & Yazdani, 1999) such as leadership skills, collaboration, time management and decision-making. Students are required to work in teams tp develop web sites for industry clients with real business needs. This helps set an authentic context, in which teams of four are formed taking the roles of programmer, graphic designer, media developer or project manager.

Students are required to develop a project proposal (needs analysis, feasibility, scope and legal contract), design specification (storyboards, concept maps and rapid prototypes), metrics for costing the project, a product evaluation and address copyright/intellectual property issues. Students are also required to integrate and practice graduate attributes such teamwork and leadership skills.

The unit consists of 13, three-hour sessions over one full semester. Each session consists of a one-hour lecture followed by a two-hour tutorial. Team skills and collaboration are continually promoted with teams of four students working together to develop project management and generic skills. Student learning outcomes include:

- Applying a range of project management and generic skills appropriate including time management, collaboration, communication, self-assessment, peer-assessment, task management, problem solving, information management and teamwork skills;
- Making a significant contribution to a team-based multimedia project;
- Demonstrating an understanding of project management models, feasibility studies, needs analysis, design specifications, timesheets, categories, planning, scheduling, costing, metrics;
- Creating and applying quality assurance procedures for testing, formative/summative evaluation strategies, procedures, file naming and templates development; and
- Demonstrating an understanding of the nature of the specialist roles of instructional designers, content experts, programmers, graphics designers, project managers, and others

Assessment includes the following:

- A project proposal, design specification and rapid prototype;
- The development of a web product, with a presentation to a large audience;

- Completing eight online tasks and giving feedback to other students. Students are required to research and produce a solution that is assessed by three other teams, as well as the tutor;
- A self and peer assessment score, negotiated with the team. This encourages students to carefully consider their role and contribution in relation to the others while working in a team; and
- An individual exam worth 50% of the overall assessment.

A custom built online courseware management system was used to help deliver the coursework (see http://www.scam.ecu.edu.au/) and the unit was delivered in blended mode, combining face-to-face seminars with online learning tasks.

Methodology

Two questionnaires were given to each student at the end of the semester to measure both their impressions of teamwork and motivational orientation (see Table 1 & 2). Students were asked to respond to each set of questions designed to elicit their views on motivational aspects of the learning task and environment:

- The first instrument focused on *Impressions of teamwork* and sought their views on the dynamics, interaction and support offered by peers in the teamwork tasks. The results were positive, indicating that students did feel supported by peers, and offered and received help within teams. A similar instrument was used by Yu (2003) to investigate student perceptions of classroom climate in a competitive environment and;
- The second instrument was also a self-report questionnaire adapted from the *Motivational Strategies for Learning Questionnaire* (MSLQ) developed by Pintrich & De Groot (1990). This instrument included was termed *Motivational Orientation* and included items on self-efficacy, anxiety, strategy use and self regulation.

How the data was processed

The data collected from the questionnaires was collected into Excel spreadsheets and processed using averages and correlation coefficients (Pearson Product) to help synthesise the data into patterns of behaviour. Tables 1-3 illustrate how the data was processed for team 1. This same process was used for each of the other nine teams summarised in Table 4.

Table 1 shows the results f or 'Impressions of Teamwork' obtained for team 1. Note that the responses were averaged to one decimal place (shown in the last row) using numeric values from the Likert scale:

Table 1: Results for team 1 – 'Impressions of teamwork'
Strongly Agree = 2; Agree = 1; Disagree = -1; Strongly Disagree = -2

	Student Number	1	2	3	4
1.	The information and assistance provided by my peers during the semester was useful	1	1	1	1
2.	The communication between me and my peers was positive and open	1	1	-1	-1
3.	My team-mates and I discussed our answers to the online questions to reach consensus	1	1	2	1
4.	I would always ask my peers for assistance when I could not clearly understand a team activity or the online questions	1	-1	1	-2
5.	My peers valued my point of view and the information I rendered	1	2	1	1
6.	I interacted with my peers to share my thoughts and ideas while completing the online activities	1	-1	-1	-1
7.	I paid attention to what my peers were saying during discussions	1	1	1	1
8.	Whenever my team-mates had trouble understanding how to do team based activities or the posted question, I would help them	1	1	1	1
9.	There was much feedback provided within the group (by my peers)	1	-1	-1	-1
10.	Overall, the teamwork activities complemented this unit	-1	1	1	1
	Average=	0.8	0.5	0.5	0.1

Table 2 shows the results f or 'Motivational Orientation' obtained from team 1, using the same Likert scale.

Table 2: Results for team 1 – 'Motivational orientation'

	Student Number	1	2	3	4
1	Compared with other students in this class I expect to do well	1	2	-1	1
2	I'm certain that I understood the ideas taught in this course	-1	-1	1	-1
3	I expect to do very well in this unit	1	1	-1	1
4	Compared to others in this class, I think I'm a good student	1	2	1	2
5	I'm sure it did an excellent job on the problems and tasks assigned in this class	-1	-1	-1	1
6	I think I will receive a good grade for this class	-2	-1	1	1
7	My study skills are excellent compared to others in this class	-1	-1	1	-1
8	Compared with other students in this class I think I know a great deal about this subject	-1	-1	-1	1
9	I know that I will be able to learn the material for this exam	-1	1	1	1
10	I prefer class work that is challenging so I can learn new things	1	-1	1	1
11	It is important for me to learn what is/was being taught in this class	1	1	1	-1
12	I am studying to satisfy my own interests and not to get food grades	1	2	-2	1
13	I think I will be able to use what I learn in this class in other contexts	1	-1	-2	1
14	I often choose topics I will learn something from even if they require more work	1	1	-2	-1
15	Even when I do poorly on an assessment I try to learn from my mistakes	1	2	-2	1
16	I think that what I am learning in this class is useful for me to know	1	1	-2	-2
17	I think that what we are learning in this class is too theoretical to be of value	1	-1	1	1
18	When I find a problem, I am usually able to work it out for myself	1	-1	1	-1
19	I am not nervous doing assessments/exams and I remember facts I have learnt	1	2	2	1
20	I do not have an uneasy feeling when I submit an assignment	1	1	1	-1
21	I do not worry a great deal about assignments	-1	1	1	1
22	When I do an assignment I don't think about how poorly I am doing	-1	1	-2	-1
23	I am able to judge how well I am doing in this subject without teacher assistance	1	-1	-2	1
	Average=	0.3	0.3	-0.2	0.3

These averages shown at the bottom of table 1 and 2 were then tabulated against the team assignment mark as well as individual student exam marks (Table 3).

Table 3: Average scores for team 1

Stud No	Teamwork Impressions	Motivational Orientation	Team Assignment /50	Individual Exam /50
1	0.8	0.3	29	35
2	0.5	0.3	29	31
3	0.5	-0.2	29	28
4	0.1	0.3	29	15
Avg	0.48	0.17	29	27

Results and discussion

The process used to obtain the average scores for team 1 (shown in Table 3) was then performed for each of the other eight teams. The average scores for the nine teams are shown in Table 4 below, sorted by 'Motivational Orientation'.

A Pearson product moment correlation coefficient was calculated between 'Teamwork Impressions' and 'Team Assignment' mark as well as 'Individual Exam' mark. This was also performed for 'Motivational Orientation'. The following significant results were obtained:

- A strong correlation coefficient of 0.9 was found between 'Motivational Orientation' and 'Team Assignment' mark;
- A strong correlation coefficient of 0.84 was found between 'Motivational Orientation' and 'Individual Exam' scores; and
- A weak correlation coefficient of 0.28 was found between 'Teamwork Impressions' and 'Team Assignment' mark.

Table 4: Average scores for all teams, sorted on 'Motivational' scale

Team No	Teamwork impressions	Motivational orientation	Team assignment /50	Individual exam /50
3	0.18	0.67	42	38
7	0.30	0.64	40	34
9	0.43	0.52	39	35
2	0.23	0.63	37	34
6	-0.03	0.62	37	34
4	0.22	0.33	33	31
8	0.30	0.44	31	28
5	0.23	0.18	30	29
1	0.48	0.17	29	27

These results in this case study illustrate that 'Motivational Orientation' was a strong predictor of team assignment and individual exam scores. This implies that students who work in a self-motivated way will have a greater chance of getting better marks. For example, results from the motivational orientation questionnaire showed that in teams where there were high levels of self-efficacy and intrinsic motivation, there was also high achievement in team assignments and individual exam scores.

The 'impressions of teamwork' questionnaire responses showed that not all aspects of the team processes were positive. For example, items 6 and 9 received negative ratings, indicating that some students found the inter-team feedback and communication processes to be less than satisfactory. This result was reflected in the weak correlation between the questionnaire responses and team assignment marks. This contrasts with the positive motivational attitudes displayed by students in the 'Motivational Orientation' instrument.

Overall the results show that indicators of positive emotional states did have an impact on academic performance. For example, students who believed they were capable learners also reported the utilisation of positive team behaviours. The results are supported by previous work in the area of motivational orientation and cognitive achievement (Zimmerman, 2000). In addition, the focus on motivation in context, as depicted in the present study, highlights the significance of mutual reciprocal influences of individuals and contextual variables, and how the dynamics of self-perceptions and goals affect motivation and performance.

Conclusion

In this student-centered learning environment, learners were given actual control and self-direction of academic tasks through task and assessment design, thereby enhancing motivational effects. However, the imitations of the study need to be discussed. First, students' metamotivation states were investigated largely through the use of two self-report instruments. While such instruments are a useful starting point for investigating affective aspects of learning environments, they need to be augmented with other measures and data, such as self-reports, interviews and think aloud protocols on order to obtain a rich corpus of data. Nevertheless, these preliminary results indicate that the there is sufficient evidence of the importance of considering motivational dimensions and self-regulated learning effects of learning activities and environments. Motivational beliefs are always hidden and covert, and while students may appear to be working within their 'comfort zones', it is revealing and telling when we delve beneath the surface to investigate deeper attitudes and beliefs about their levels of anxiety and perceptions of the learning process. The results, though small scale indicate that learners' capacity to engage in deep and generative learning is closely linked to efficacy beliefs, motivational states and levels of confidence. Educators and designers of learning task therefore need to investigate these affective dimensions of the learning process in order to develop more challenging zones of engagement for learners.

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