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ABSTRACT

Continuing education students are usually mature students who have a wealth of experience from which their peers and the lecturer could profit. An effective teaching method with such students is the use of cooperative work assignments, but a problem that prevents lecturers from using this method is the difficulty of assigning grades to individual students for their collaborative group work. This paper describes an effective assessment procedure that puts individual accountability into the assessment of cooperative assignments so that students are fairly rewarded for sharing their experience. The technique, which involves peer evaluations of each member's contributions to the work, was tested with 57 undergraduate and graduate students in 8 cooperative groups. Students were asked to evaluate the contributions of each member of the group to the project, but the project grade was assessed without regard to these ratings. The variation in the marks received by a group member were used as a measure of the reliability of the member's grade, and the reasons given for each of the peer evaluations served as indications of the construct validity of the group member's mark. The peer assessments were used in combination with the group mark to award a grade to each participant. Results from the study support the use of the technique in assessing the contributions of each group member. (Contains 2 tables and 18 references.) (SLD)

Rewarding Shared Experience: Assessing Individual Contributions to Team-Based Work

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Abstract

Continuing education students are usually mature students who have a wealth of experience from which their peers could greatly profit and in which their lecturer could beneficially share. One effective teaching method through which this experience can be harnessed and focused on the course content is through the use of cooperative work assignments. A major problem that prevents lecturers from utilizing this method is the difficulty of validly assigning grades to individual students for their collaborative group work. Students and faculty have complained that group grades are unfair, undermine motivation and violate individual accountability. Patches that attempt to overcome these practical assessment problems are usually cumbersome and unwieldy, using inordinate amounts of staff time and creating more problems than they solve. This session demonstrates an effective efficient assessment process that has the necessary checks and balances mature students expect of our assessment processes. It is a proven method that puts individual accountability into the assessment of cooperative assignments so that students are fairly rewarded for sharing their experience and can also benefit from the experiences of their peers.

Introduction

Team-based cooperative learning is a valued technique that enhances individual learning through peer help, the sharing of experience and the facilitation of social interaction. However, traditional methods of assessing an individual's contribution to a cooperative performance do not afford the degree of reliability and validity expected of accountable assessors. One of the main problems is that the more cooperative the work becomes then the less knowledge the teacher has of each individual's contribution. Yet, pre-defining an independent role to each individual, which increases the accountability of assessment, diminishes the advantages of cooperative work. The effects of 'social loafing', unequal resources and destructive competition associated with this problem, and the effort required to try and circumvent these effects, reduces teachers' readiness to use this valued technique.

The aim of this research is to develop an effective, efficient method of assessing each individual's contribution to cooperative performance that is independent of how the group members were chosen and independent of the assessment criteria deemed appropriate for the performance, yet incorporates sufficient reliability measures and validity checks for accountable assessment. The theoretical significance of this work is that this method, by separating the assessment method from the performance criteria, sheds light on the group's cooperative dynamics and identifies a

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fundamental learning problem of low performers in cooperative groups that might not have been anticipated. The educational significance is that the method increases the potential use of cooperative learning with continuing education students by overcoming these fundamental drawbacks.

The research design employed the assessment method with male and female students on a third year university assessment course and also with psychology students on a taught Master's course (n=42). The ages of the students ranged from 20 to 46. The method was tested on groups of sizes 4 to 12. The method utilised the assumption that the cooperating students in a group are the ones with the most valid information on the contribution of each individual to the group's performance. The students were made aware of the performance criteria, as would normally be expected. The assessment method was then explained to the group(s). The students were each given a confidential assessment sheet to be sealed in an envelope and included with the group's product.- see Figure 1. The assessment sheet asked for an estimate of what percentage of the final mark each group member deserved based on their contribution, plus the rationale for each estimate.

The variation in the marks awarded to an individual indicated the reliability of each individual's mark. The agreement in the rationales for awarding an individual's marks indicated the validity of the mark. In addition, patterns within the estimates highlighted cooperative and competitive subgroups. Analysis of the reliability measures, with the marks awarded and with the marks received, allowed the identification of a learning problem that poor performers seem to face independently of the content and type of performance being assessed.

Advantages of using team-based work

Teachers recognize that team-based cooperative learning is an excellent teaching technique. One of the reasons for this is that teachers consider co-operative learning to be useful for their students' social and psychological development as well as for their academic learning (Khattri, 1991). Research in social learning indicates that students learn thinking strategies from these interactions with their peers (Zimmerman, 1990). Students are energised by cooperative groupwork and see distinct learning advantages in this paradigm (Orsmond, 1996). Student reactions to the cooperative assessment processes are overwhelmingly positive (Griffin, 1994). Groupwork has been shown to improve student involvement and ownership, and to increase student retention and transfer of learning (Petty, P. 1997).

One way in which group learning works is that it:

".. forces learners to adjust their thinking to that of others. When students have to think about the alternative viewpoints of group members, they have to elaborate and defend their own ideas and debate the merits of their opinions to others. This promotes a deeper organization and understanding of their own knowledge." (Tombari & Borich, 1999, p.100).

These recognized advantages of team-based work have increased the popularity of this method of teaching so that .. "Classrooms at all levels of education are increasingly emphasizing group-based or cooperative learning strategies." (Airasian, 1994, p.301)

Accountability problems of using team-based work and some attempted solutions

Teachers who use this technique with continuing education students would also like to award each individual in the group a grade that is based on the assessment of the group's work. However, compared to traditional assessment methods, there are many problems with the validity and reliability of assessing group assignments (Falchikov, 1986; Powers & Medena, 1984; Salend & Sonnenschein, 1989). These problems contribute to the difficulties of replacing high-stakes objective tests with these pedagogically preferred 'alternative' assessments of continuing education students.

Some common, yet inadequate solutions, to the group assessment problem are to assume that each student has made an equal contribution and award each student the same grade. This is not popular with students, as the assumption is rarely justified. Conway (1993) reports that students complain that group scores are an inadequate reflection of their individual effort. This solution can also act against team work and cause social loafing (Gibbs, 1993; Rotfeld, 1998). The other extreme is for the teacher to give detailed roles, guidelines and checklists. This is done when a major instructional aim is to teach socialization skills rather than to focus on performance and understanding in the content area. This is because checklist criteria are usually valued social skills such as coaching, function-filling, social facilitation and interaction. These can help motivate continuing education students and help them to identify with their peer group. Examples of criteria for checklists are 'Reports to group', 'Completes assigned tasks on time', 'considers viewpoints of others', 'encourages other to do well', and 'willing to share materials with others' (Airasian, 1994, p.256; Linn, & Gronlund, 1995, p.276). When this is the intention, checklist criteria for these social skills are given beforehand so that the groupwork will promote socialization by the students working towards these prosocial assessment criteria. Hence, it is necessary to decide on a clear instructional purpose of using groupwork, for example to foster prosocial behaviours or to improve performance and understanding in a content area, and then ensure that collaboration works toward, rather than against, the purposes of the assessment (Webb, 1995). Once these decisions have been made then sensitive professional judgement should temper the degree of teacher intervention, because ".. to push too hard for individual pupil solutions and contributions destroys many of the benefits of cooperative problem solving." (Airasian, 1994, p.301).

If promoting socialization is not an instructional aim then students can use their own criteria. Because continuing education students are usually mature with valued experience they can be asked to peer mark their colleagues and to give their own criteria or justification for the mark they have given. The consistency of these reasons can then be used for construct validity of the average mark received by each single group member. This was the method used in the research reported in this paper.

Testing of the technique

Students taking an undergraduate assessment course and students taking a Masters course in psychology were given group work assignments as part of their summative course assessments. To respect the working restrictions of these students - such are work and family commitments - and to enhance personal bonding, the students chose their own groups (sizes 2 to 10) to meet their own practical requirements. Only results for students who chose groups of size 4 to 10 are included in this report, because these group sizes are appropriate to the statistics used in the analysis. There were eight such groups which included 57 students, males and females, whose ages ranged from 20 to 46 years.

The measurement method used in this research was to separate the assessment of the final group product from the assessment of students' individual contributions to the group product. The products were assessed according to content standards set at the beginning of the groupwork. The contributions of individual group members was confidentially peer assessed at the end of the groupwork. Results of other studies have shown that students think peer assessment is an important part of the group grading process (Keaten & Richardson, 1993), and attitude surveys have shown that students perceive this separation of assessment as fair and effective (Beard, 1989).

Students were advised, right at the start, to be sure that other group members knew how they were contributing to the group's work. Each member was asked to keep a log of everyone's contributions. Students were told that at the end of the course they would award each other marks for their contributions to the group's work. These logs were to be used to supply the confidential justifications for the marks students would award. The purpose of this design was to moderate any personality or popularity effects that might have influenced students' peer assessments, as have been reported by Brown and Knight (1994). The logs, which were also collected, were to be used as a fail-safe source of validation, in conjunction with post-assessment interviews, if that should be necessary. The instructions for the confidential feedback forms were as shown in Figure 1.

Share Certificate

Private and Confidential - do not show this information to any other group member. When it has been completed, fold it and staple it. Put it in an envelope with the other share certificates from your group and submit the envelope with the group work.

Please print your name and ID no.

Please *Sign*

Below are the names of the people in your group. Put a star * by your name. In the box by each name write the percentage you think that person deserves - including yourself. Then, for each person, give your reasons why you decided that person deserved the percentage you gave - including yourself. When you have finished check that the total is 100%

Figure 1: instructions for the confidential feedback of peer assessments of group contributions

These peer assessments could be expected to have a higher content validity than those of an external assessor. This is because the group members could be expected to know the exact content of each member's contribution to the group's work better than an external assessor, such as the teacher. However, the students may not be so expert as an external assessor in the criterion assessment of the content standard. Hence, the content standard of the product was assessed in the traditional manner against the criteria that had been given at the start of the course.

Assessing an individual's contribution

Table 1 illustrates how the product assessment was weighted by the number of students in the group and combined with their confidential peer assessments to arrive at each individual's mark.

Table 1: Weighting product assessment by group size and sharing total marks according to the average peer assessment for each member.

Group 2 Assessment				Percentages given by group members					Average received	Std. Dev received	Raw Individual mark received	Individual mark
Group Number		Marks available	395									
Subject area		Group % for assignment	79									
10	Maths	Number in group	5									
st/id	disc-id	name	st/id	21	22	23	60	62				
21	95-(	Confidential Names and IDs	Nicola	25.0	25.0	24.0	25.0	24.0	24.6	0.55	97.2	97
22	95-(		na	21.0	19.0	18.0	19.0	20.0	19.4	1.14	76.6	77
23	95-(		elix	14.0	15.0	17.0	17.0	15.0	15.6	1.34	61.6	62
60	97-(		ndre	24.0	23.0	23.0	22.0	22.0	22.8	0.84	90.1	90
62	97-(		nna	16.0	18.0	18.0	17.0	19.0	17.6	1.14	69.5	70
		% total check = 100%		*100*	*100*	*100*	*100*	*100*	*100*			
Corr sd of given		Means of marks given		20.0	20.0	20.0	20.0	20.0	20.0	1.0	79.0	79.2
with received =	0.74	St.devs of marks given		4.8	4.0	3.2	3.5	3.4	3.7	0.3	14.6	14.3

Table 1 shows the results from a group of size five and how the five students' assessments from their confidential forms have been processed. For example, column 21 has the five marks given by student No.21 these are 25.0, 21.0, 14.0, 24.0 and 16.0 and the '% total check' is 100 as required. When the marks have been entered for all five columns, in the same row order, then each row holds the marks received by each student. So, in this example, the first row is for student 21 and the marks received for that student are respectively 25.0 (self-assessed), 25.0 (from student 22), 24.0 (from student 23), 25.0 (from student 60) and 24.0 (from student 62). The average of this row, 24.6%, is the percentage of the total mark that the group has allotted to student 21. To find the final mark for this student we find the number of marks that have been made available from the assessment of the performance and the number of group members. In our example it is 5x79=395. That is the quality of the finished work was independently assessed at 79%. The 79 is multiplied by the number of members in the group, 5 in this case, and each student gets his or her share e.g. student 21 gets 29.4% of 5 x 79 which is 97% as shown in the last column of the table.

The results can be used to assess the Internal reliability and construct validity of the individual's mark. The variation in the marks received by a group member are used as a measure of the reliability of that member's mark. The reasons given for each of these marks is used as an indication of the construct validity of the group member's mark.

Identifying a learning problem of low performing continuing education students

Findings from the analysis of the marks given and received by the group members showed a consistent pattern across all eight groups and different content/subject areas. The variation in the marks that were given

by a group member to the other members of the group was positively correlated with the total mark that was received by that group member from the rest of the group. It must be remembered that the two confidential processes, (i) giving a mark to others and (ii) the average of the marks received, are independent processes that are now shown to be statistically correlated.

Table 2, lists the findings from all eight groups to illustrate the consistency of this finding. These groups are not 'samples' and so it is the effect-size of the correlation that is of interest. The significances are given only for completeness.

Table 2: Showing a consistent positive correlation across groups and subjects of 'marks received' with 'variation in marks given'

	Group 1	Group 2	Group 3	Group 4
Corr	.7650	.7418	.9690	1.0000
n	(10)	(5)	(5)	(5)
Sig	P= .010	P= .151	P= .007	P= .000

	Group 5	Group 6	Group 7	Group 8
Corr	.7317	.9061	.5598	.3389
n	(4)	(5)	(10)	(13)
Sig	P= .268	P= .034	P= .092	P= .257

This correlation means that the less a group member is able to distinguish between the value of the contributions of group members then the lower is the mark independently awarded to that group member by the other students.

Conclusions

Educators and mature students have a clear pedagogic preference for team-based co-operative performance assessments over traditional high-stakes objective testing. However, problems of reliability and validity associated with the assessment of individuals' contributions to co-operative performances make it difficult to support these educationally preferred forms of assessment for high-stake gate-keeping decisions. The method of assessing an individual's contribution to co-operative groupwork detailed in this paper may make these 'alternative' assessments more widely acceptable for important summative evaluations. The method detailed here offers (a) evidence of reliability which is based on the variation of peer assessed marks received, (b) evidence of construct validity which is based on the reasons given for group members' marks, and (c) content validity which is based on group members' insider-knowledge of each individual's contribution to the product content. The logs of individual's contributions, and the availability of post-assessment interviews, offers the fail-safe rigour necessary to support the use of groupwork for high-stakes summative assessment with continuing education students. In addition, the method indicates that low performing students have difficulty discriminating between components of the group's performance and this might be a fundamental factor that teachers need to address in order to raise the attainment level of continuing education students in team-based learning assignments.

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