

Methods for deriving individual marks from group work

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Abstract

Group assessment is a valuable teaching and learning method (Springer et al., 1999). This has been comprehensively demonstrated in the teaching and learning literature both in general (Johnson et al., 1991) and in specific contexts. This assessment practice promotes questioning, discussion and debate and encourages students to become active team players (DIT, 2013). However, when using this form of assessment, it is important to recognise that it is "individuals who graduate and gain qualifications" (Gibbs, 2009, p.4). The problem of freeloading has been identified and one of the suggested methods of reducing this is to incorporate individual assessment into the marking mechanism (Gibbs, 2009). From our review of the literature, we identified six possible methods of assessing the contribution of individuals within groups. However, it is evident from our research that there are benefits and challenges associated with each method. Particular methods are more applicable to specific subject areas, student levels, and class size and instructor resources. Based on these findings, we have produced an artefact to assist instructors in selecting and applying the method deemed most appropriate for their teaching context.

Introduction

Group assessment is a valuable teaching and learning method (Springer et al., 1999). Specifically, this assessment practice promotes questioning, discussion and debate and encourages students to become active team players (DIT, 2014). However, when using this form of assessment, it is important to recognise that it is "individuals who graduate and gain qualifications" (Gibbs, 2009, p.4). The problem of freeloading' and reduced individual effort if there is no marking mechanism to identify the contribution of individuals continues to be problematic as identified over thirty years ago in Latane, Williams and Harkins (1979). One approach to addressing this challenge is to incorporate individual assessment into the marking mechanism (Gibbs, 2009; Bacon and Stewart, 1999). The purpose of this research project is to review the teaching and learning literature to identify methods that can support the individual assessment challenge faced by instructors when using group project work. Using our findings from the literature review, the aim is to develop an artefact that support instructors in their development of group assessments that incorporate an individual assessment component.

Literature Review

The various methods available for deriving individual marks from group projects has received significant attention in the literature in recent years (Gibbs, 2009; Felder & Brent, 2001; Lejk & Wyvill 1996, Millis & Cottell, 1998, Willis & Millis, 2004). From our review of the teaching and learning literature, we identified six methods to address the individual assessment challenge faced by instructors when using group project work. These methods are discussed in detail below. Furthermore, we detail the benefits and challenges of using each method and determine the best practice in implementing each, as supported by academic studies.

Method 1: Including an individual assessment component

This method has several possible variants outlined in the literature, as follows:

A. Group outcomes assessed based on individual component only

The first method involves setting a group project, with formative feedback being given, but no mark/credit allocated. The students are then individually assessed on their learning in the group project through an individual assignment/task/exam question, with all marks being allocated on an individual basis (Hindle, 1993). The benefits and challenges of using this method are presented in table 2.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none">• May increase interest in the project - students may be more motivated to learn about the work of their fellow group members• Higher marks achievable for students who demonstrate a knowledge of all aspects of the group project	<ul style="list-style-type: none">• Students may ignore the group project in order to study for the exam/prepare the report etc.• May mean additional work for instructor• May not be effective - students may be able to complete the individual assessment simply by proofreading the group project report• May undermine the motivation for students to collaborate and may lead to a perception that students may not necessarily benefit from the effort they expend by collaborating with others.

Table 2. The benefits and challenges of assessing groups based only on individual assessment

B. Group project mark moderated based on individual assessment

The second variant on this method involves moderating the group mark for each individual member based on an individual assessment (Commins, Fitzgibbon & Boerson, 1999). The benefits and challenges of using this method are presented in table 3.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • All members have the ability to earn extra credit (unlike peer assessment where usually some members gain marks at the expense of others) • Students may be less likely to ignore the group project and focus all attention of the individual assessment 	<ul style="list-style-type: none"> • May mean additional work for instructor

Table 3. The benefits and challenges of moderating the group mark based on individual assessment.

C. Dividing the group task between individuals and allocating some or all of the marks to component tasks

This method involves allocating specific tasks to individuals within the group and assessing them based on their performance of these tasks. This reflects suggestions by the DIT Assessment Handbook (2008) for instructors to “assign individual responsibilities and assess each member on the degree to which they have met their individual contracts.” Table 4 presents the benefits and challenges of using this method.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Group dynamics may be enhanced when responsibility for each component is clearly identified • Students may perceive this to be a more “fair” method of marking as there is more transparency 	<ul style="list-style-type: none"> • May mean additional work for instructor – in dividing the project into individual components (however Gibbs (1995b, 1995c) provides some useful exercises and guidance to assist students in performing this task themselves) • May result in a decrease in the motivation to collaborate (Earl 1986 suggests instructors allocate 50% of the marks for the quality of an individual’s task/component, and 50% for the quality of the overall group project to minimise this effect) • Only possible for projects that lend themselves to being broken up into separate identifiable tasks

Table 4. The benefits and challenges of dividing the group task between individuals and allocating some or all of the marks to component tasks

When using this individualised approach to assessing group work, previous studies indicate that it is very important to take care in designing the individual assessment/task/exam question. The instructor should ensure that high marks are only achievable by students who have fully participated in the group project (Gibbs 2010; Lejk & Wyvill, 1996). Also, this method should not be the only method used to assess the group work. It has been suggested that an appropriate split may be to allocate 50% of the overall marks to the individual assessment component, and the other 50% to the quality of the overall group project (Earl 1986).

Method 2: Instructors moderating the group mark for each individual on the basis of special knowledge about the individual.

Informal observation as a methodology may be sufficient where group work is supervised, with individuals rated through a common set of scales concerning contribution to different components of the work (Gibbs 1995a). An overview is provided in table 5. However, such methods may prove incomplete and potentially unfair to some group members. Additional grading methods suggested to ensure fairness include:

- Team members keep an assessable project log to show individual contributions;
- Students separately present and answers questions on project specifics to receive +/- % pts.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Simple format easy to implement and monitor in class 	<ul style="list-style-type: none"> • Potentially unfair to students where work is completed outside of observed class time • Relies on full buy-in and full attendance from group

Table 5. The benefits and challenges with using Instructors moderating the group mark for each individual on the basis of special knowledge about the individual.

Method 3: Students moderating each other’s group mark on the basis of their inside knowledge about that individual.

The “Knicker method” (Maranto and Gresham, 1998) involves the instructor making an expert academic judgement about the quality of the product with students peer reviewing contributions to that product. Scholars agree that this method produces a better spread of marks than an instructor allocated group mark only (Goldfinch & Raeside, 1990; Conway, Kember, Sivan & Wu, 1993; Goldfinch, 1994, Lejk & Wyvill, 1996; Cheng & Warren, 2000; Li, 2001; Sharp, 2006, Freeman & McKenzie, 2002). Students also perceive this method to be fair, though there is less evidence on students’ perceptions of fairness than on the impact on student behaviour.

Habeshaw, Gibbs & Habeshaw (1993) propose a variation on the method of group members using specified ratings to moderate each other's mark from a group mark. This method involves the instructor allocating a group mark and multiplying it by the number of students in the group. This pool of marks is then distributed amongst its members as they see fit.

A simpler method involves students allocating sanctions against group members if contribution falls below an agreed standard. Sanctions may be rescinded during the project if contributions improve. Gibbs (1995c) suggests that formative feedback on group functioning and behaviour may alleviate the need for such sanctions.

The use of formative only assessment has been reported to improve both involvement and quality of outcomes in group projects (Freeman & McKenzie, 2002; Falchikov, 1995). Ngar-Fun Liua & David Carlessb (2006) argue the case for a peer feedback process as an end in itself, or as a precursor to peer assessment involving the awarding of marks. They also recommend some strategies for promoting peer feedback, through engaging students with criteria setting and for embedding peer involvement within normal course processes. Table 6 presents the benefits and challenges of using this method.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Freeman and McKenzie (2002) claim this method produces a better spread of marks than an instructor allocated group mark only. • Students perceive this method to be fair as they can contribute to the final grades allocated • Students have the opportunity to develop critical skills while engaged in self and peer assessment 	<ul style="list-style-type: none"> • Complexity of grading methodology and set-up time for instructor • Lack of evidence supporting student perceptions of fairness of methodology • Use of formative only assessment has been reported to improve both involvement and quality of outcomes in group projects (Freeman & McKenzie, 2002; Falchikov, 1995)

Table 6. The benefits and challenges of students moderating each other's group mark on the basis of their inside knowledge about that individual

Method 4: Peer assessment

The use of peer assessment as part of the assessment of groups is one approach to addressing the individual assessment challenge faced by instructors when using group project work. Peer assessment can play a role in both formative and summative assessment. Defined by the DIT Assessment Handbook (2008, p.21) as the "assessment of the work of others of equal status and power", it shifts full or a proportion of the assessment responsibility to the student. Although recognised in the teaching and learning literature as a useful tool for promoting effective learning through giving and receiving feedback (Gielen, Dochy, Onghena, Struyven, & Smeets, 2011; White, 2009), this project will focus on the

reliability of the assessment method for instructors assessing the contribution of individuals within groups. Peer assessment can be used by instructors to assign individual marks to students for their contribution to group work by mapping the single holistic group mark to individual marks using the peer assessment scores.

The value to the instructor with using peer assessment as a part of the assessment of groups relates to whether the assessment mechanism can be trusted (Gibbs, 2009). Student familiarity with the criteria used improves the trustworthiness of their judgements (Falchikov & Goldfinch, 2000). Furthermore, the peer assessment marks are more reliable when they involve marking a global judgement rather than several dimensions (Lejk, & Wyvill, 2002) which is likely to also resemble the instructor’s assessment (Falchikov & Goldfinch, 2000). In addition, peer assessment should assess academic products and processes, rather than professional practice and should adopt a holistic approach rather than a category-based approach (Lejk, & Wyvill, 2002; Falchikov & Goldfinch, 2000).

Secondly, multiple peer assessments do not sufficiently improve the reliability (Falchikov & Goldfinch, 2000) and peer marks are not affected by the gender of the assessor (Tucker, 2014; Falchikov & Magin. 1997). The main issue is that students are committed to the process which is influenced by the learning environment the instructor has created (Yan & Kember, 2003).

Thirdly, peer assessment marking should be conducted anonymously to increase reliability. Lejk and Wyvill (2001) found that secret peer assessments where a student did not know which student or students gave which marks led to a higher spread of individual marks within the group than the agreed assessments.

Drawing on our review of the literature on peer assessment, there is no evidence that this assessment type is more or less reliable in different subject areas or on advanced or introductory modules (Falchikov & Goldfinch, 2000). However, there are several benefits and challenges to using peer assessment as a way to allocate different marks to individual students. An overview is provided in the table 7.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none"> • Peer marks are not affected by the gender of the assessor • No need for multiple peer assessments as they do not sufficiently improve the reliability (Falchikov & Goldfinch, 2000) • Assessment practice is applicable to all subjects and programme levels 	<ul style="list-style-type: none"> • Ensuring anonymity may be difficult to achieve • Development of peer assessment form that adopt a holistic approach rather than a category-based approach may be time consuming

Table 7. The benefits and challenges with using peer assessment to allocate different marks to individual students.

Method 5: Student self-assessment

Self-assessment is fundamental to the concept of self-directed learning and the maintenance of professional competence (Ward, Gruppen & Regehr, 2002). Many studies have considered whether students can carry out self-assessment in a reasonable way without awarding themselves over-generous marks (Gibbs, 2009). The results of these studies are mixed, however, certain trends have emerged. In general, it is found that more experienced students and higher ability students tend to award themselves a lower mark than their teachers would. The opposite is true of less experienced and lower ability students with these students overestimating their marks compared with the judgement of the teacher (Boud & Falchikov, 1989).

Students in STEM courses tend to assess more accurately than other students, perhaps due to the objective nature of these subjects (Boud & Falchikov, 1989). It has also been found that when the self-assessment counts towards an overall grade students tend to overestimate their marks, whereas in low stakes assessment their marks agree more frequently with their teachers'. Sadler and Good (2006) recommended that teachers should train their students in self-assessment and should monitor students for accuracy. They found that, when used responsibly, student grading can be highly accurate and reliable. In this study, self-grading appeared to further student understanding of the subject matter being taught. Table 8 presents the benefits and challenges of using this method.

<i>Benefits</i>	<i>Challenges</i>
<ul style="list-style-type: none">• Accurate and reliable form of assessment if students are guided initially• Particularly applicable to STEM• Has been shown to deeper understanding of subject matter	<ul style="list-style-type: none">• Time required to train students to self-assess reasonably.• Additional work for instructor• May be difficult to implement in the humanities/arts due to subjective nature of assessment in these areas

Table 8. The benefits and challenges with using self assessment to allocate different marks to individual students.

Method 6: Online resources for peer and self-assessment

In a search for more effective group assessment strategies a number of on-line assessment tools have emerged in recent years. The three most popular of these are CATME, SPARKPLUS, and WebPA which are outlined briefly below. Table 9 provides an overview of the benefits and challenges with using each of the online tools to allocate different marks to individual students.

As these are all commercial applications (to varying degrees), we found it difficult to find impartial research on the tools. Each application promotes literature on their respective websites that is largely positive.

CATME (<https://www.catme.org>), which refers to Comprehensive Assessment of Team

Member Effectiveness, is a free set of tools designed to help instructors manage group work and team assignments more effectively. First released in 2005, it comprises of a range of tools available such as CATME Team-Maker, CATME Peer Evaluation, and CATME Rater Calibration. The tool was developed by a group of professors across several universities within the United States. CATME takes away much of the administrative burden that instructors face when trying to organize and manage teams, communicate with students, and facilitate effective peer evaluation. The tool requires a faculty log-in (requiring faculty wide sign up). The two main functions of the tool are team maker and peer assessment with the later function specifically useful to inform the allocation of different marks to individual students.

SPARK_{PLUS} (available at <http://sparkplus.com.au/factors>) was the second on-line tool that we reviewed. It is a useful assessment tool as it provides students with the opportunity to make self and peer assessment within the context of group work. The use of SPARK_{PLUS} can provide instructors and students with information on the strengths and weaknesses of group members as evaluated by their group peers. SPARK_{PLUS} supports the provision of constructive feedback to students (Wu, Chanda, & Willison, 2010). In addition, the on-line tool allows students to track their attributes development and demonstrate their competence to group work and enhance students' engagement in group work (Wu et al., 2010). However, Wu et al. (2010) found that the value of the tool to teaching and learning can be misinterpreted by students who viewed it as a mechanism to justify adjustments in the group mark to an individual mark at the end of the assessment. From our review of the tool, a number of challenges to an instructor adopting the tool were identified. These include the inactivity of several website links and few research studies on the value of the self and peer assessment tool. Furthermore, the tool seems predisposed to "detecting free riders", "over-raters" and "saboteurs".

WebPA, the third tool that we reviewed, is an online automated tool that facilitates peer moderated marking of group work. The WebPA tool was originally developed at Loughborough University (UK). The project ran from October 2006 through to March 2009. WebPA is just one of the open source systems and online shared services that has been designed and developed at the Centre for Engineering and Design Education at Loughborough University for the benefit of sector. The online tool allows students to carry out a group task set by the instructor and include peer moderated marking of the performance of the group. A weighting factor is generated for each individual group member, which is derived from each student's input against defined criteria. Based on the total mark given to the group task, assessed and allocated by the academic tutor in the usual way, the weighting factor is then used to moderate marks providing an individual mark for each student.

<i>System</i>	<i>Benefits</i>	<i>Challenges</i>
CATME	<ul style="list-style-type: none"> • Free to use • Peer assessment function facilitates the allocation of different marks to individual students 	<ul style="list-style-type: none"> • Requires faculty log-in and verification • Time consuming to set up • Faculty log-in (requiring faculty wide sign up)
Spark PLUS	<ul style="list-style-type: none"> • An opportunity to make self and peer assessment within the context of group work • Provides information on the strengths and weaknesses of group members as evaluated by their group peers 	<ul style="list-style-type: none"> • Website difficult to use and missing online links • Value of the tool to teaching and learning can be misinterpreted by students (Wu et al., 2010) • Tool seems predisposed to “detecting free riders”, “over-raters” and “saboteurs”
WebPA	<ul style="list-style-type: none"> • Clear, informative and well-structured website • Facilitates peer moderated marking of group work 	<ul style="list-style-type: none"> • Unclear if there is an initial cost • The maximum allowable group size is 8 students

Table 9. The benefits and challenges with using each of the online tools to allocate different marks to individual students.

Artefact

Drawing on our findings from the literature, we developed a booklet and flashcards which are available separately in Arrow (<http://arrow.dit.ie/lcpgdprp>). The purpose of the booklet is to help instructors identify the most appropriate method for their teaching context. The flashcards provide instructors with tips for using each method.

Conclusion

It has been suggested in the literature that determining the most appropriate method of assessment depends on the intended purpose and outcome of the group work, and the contribution the assessment is making to the overall module mark (Jaques, 2000). From our review of the literature, it is evident that there are benefits and challenges associated with each method. Particular methods may be more applicable to specific subject areas, student levels, and class size and classroom / instructor resources. For example, student self assessment may be more appropriate to STEM subject areas rather than the arts and humanity as assessment is usually based on objective criteria. Based on these findings, we conclude that “no one size fits all”. Drawing on this insight, the artefact developed can assist instructors in selecting and applying the method deemed most appropriate for their teaching context.

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