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IMPLEMENTING PEER ASSESSMENT IN ONLINE GROUP PROJECTS

This paper examines in detail the processes needed to implement peer assessment in online group projects, using a real-world example from one of GetSmarter's online short courses.

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INTRODUCTION:

Peer assessment is an important part of group work. When students are expected to work together on a project, it is essential to include some form of peer rating by which group members can hold one another accountable for their respective contributions. Doing so in a physical classroom using paper-based systems is easy, but adapting the peer assessment process for use on an online course can be fairly challenging, as noted in prior studies on the topic. This study examines the work GetSmarter's instructional design and course delivery teams undertook to plan and implement peer assessment for group projects on an online course with over 950 students.

The paper starts with a brief overview of the purpose of peer assessment, the reasons for using peer assessment in group projects, and some of the different methods for doing so. From there, the study context briefly describes the structure of the course in question, particularly with regards to the group work it involved, and an outline of the requirements for the peer assessment we had to build. The method is then explained by means of a detailed account of the constraints that influenced our design decisions, the practical challenges that arose during implementation of the design, the lessons we learned with regard to the flaws in our approach, and, finally, the improvements we made for the course's second presentation.

This paper will be useful for teams who are interested in the mechanics of implementing peer assessment in online courses at scale. As a comprehensive and critical account of GetSmarter's work in online peer assessment, this paper aims to identify areas that could benefit from further research and testing. The detailed work that went into this study will be used to improve the efficacy of peer assessment on GetSmarter's future courses.

BACKGROUND:

Peer review is widely used in teaching and learning practices as a means for instructors and students to assess work. When used among student groups, peer review can impact learning to varying degrees, depending on the scope of its role in the learning journey. For example, when peer review is positioned as a core activity that requires extensive, ongoing effort, it can help students develop high-order thinking skills, like the ability to assess a piece of work, or evaluate feedback. Similarly, when peer review occurs at regular intervals throughout a course, it can serve a developmental purpose; learners can make incremental improvements to their work based on the feedback they receive from their peers.

Simplified methods of peer review may be preferred if students already need to manage a sizeable workload. This is especially true of group projects, where the learning outcomes related to collaboration and project output are considered more important than the competences associated with completing a comprehensive peer review exercise.

In this sense, peer assessment can be thought of as "an arrangement in which individuals consider [and assess] the amount, level, value, worth, quality or success of the products or outcomes of learning of peers of similar status" (Hall and Buzwell, 2012). Basically, peer assessment is a tool for peers to rate or score one another's work. In the context of group project, peer assessment can be applied to:

- Rewarding individual effort, given that a group mark does not always fairly reflect each student's individual contribution (Conway, et al.,1993);
- Increasing student accountability, since group members are more likely to take ownership of tasks and pull their weight to avoid receiving a negative peer rating (Hall and Buzwell, 2012);
- Addressing the frustration of free-riding, whereby non-contributors piggyback on others, and still earn the same grade, which can have a negative impact on group sentiment (Hall and Buzwell, 2012).

In addition, peer assessment can serve to empower students by giving them a degree of influence in the grading process, which is likely to result in greater levels of satisfaction with final grades (Hall and Buzwell, 2012).

Conway et al (1993) identify three methods for peer assessment:

1. Pool of marks
Group members distribute marks amongst themselves based on their views of what each person contributed. For example, if a group of five peers receives 60% for their project, they will have 5 x 60 = 300 marks to distribute. This method gives groups full control over the peer assessment process, though it has the potential to lead to a hyper-competitive group atmosphere that detracts from the aim to have constructive interactions. The pool of marks method should therefore be avoided, unless group negotiation is a key learning outcome of the project work.

2. Group mark plus or minus contribution mark
With this method, peer ratings are used to allocate each student a contribution mark, which can then be either added to or subtracted from the group mark. Careful thought should be given to the relative weighting of the group and contribution marks. For example, if contribution marks are weighted highly, a subtraction procedure is likely to fail students unless they produce excellent projects. On the other hand, if contribution marks are added to the group mark, and the former is assigned a low weighting, students may complain that they were not adequately rewarded for their individual efforts, or that there was not enough at stake to deter free-riders (Conway, et al.,1993).

3. Multiplication by weighting factor

Similar to the method described above, this approach also uses a contribution mark and a group mark. The difference here however, is that the contribution mark is used to weight the group mark, so that a student who makes an average contribution to the project is awarded the group mark, and those who make greater (or lesser) contributions receive more or less than the group mark.

This method is best explained through an example:

Silvana is in a group with two peers, who score her 14 and 10, respectively, for her contribution to their group project. Silvana's total contribution mark is therefore 24, compared to her peers, who scored, say, 25 and 32. Silvana's overall mark can then be calculated as follows:

Individual Weighting Factor = Individual Effort Rating / Average Effort Rating
Average Effort Rating = (24+25+32) / 3 = 27
Silvana's Weighting Factor = 24 / 27 = 0.88
The group mark for the project = 75.5
Silvana's mark = 0.88 x 75.5 = 66.4

According to Conway et al (1993), students consider the multiplication method to be the most fair and equitable procedure for peer assessment. For instructors, however, using the method's intricate formulas can be time-consuming, a challenge that is further amplified in classes with high student numbers.

Apart from being time-consuming, this method for peer assessment can be managed with relative ease when applied using paper-based systems in a physical classroom. In the online environment, however, the process becomes far more intricate.

Indeed, even minor procedural steps that are typically unambiguous and straightforward in paper-based classroom peer reviews, become very difficult when implemented online (Knight and Steinbach, 2001). In their study to adapt peer review to an online course, Knight and Steinbach identify four procedural steps that proved particularly challenging: assigning students to do specific peer reviews; handling late reviews; hiding reviewer identity before making reviews available to reviewees; and distributing completed peer reviews back to reviewees.

In our work in peer assessment, we faced most of the same challenges, and many more. One of the broader findings of the Knight and Steinbach study, similar to what we learned, was that the lack of specialised software to support the specific requirements of a peer assessment results in substantially more complexity with regard to its implementation.

STUDY CONTEXT

This paper focuses on the peer assessment that was incorporated in the group project work on the first presentation of a large MIT online certificate course, designed and delivered in partnership with GetSmarter. Future Commerce ("Fintech") was launched in 2016. Below are some facts to provide a brief overview of the course design, and to illuminate areas that are key to understanding the context for the peer assessment:

- The first presentation of the course ran from June 6 - August 30, 2016. The course was presented for a second time in September 2016.
- On the first presentation over 950 students from 70 different countries enrolled.
- The course began with a 2-day Orientation period, wherafter 12 academic content modules were released weekly every Wednesday.
- The course entailed three phases:
    - Phase 1 = All students worked individually to record and submit their own 60-second elevator pitch for an original fintech idea or venture they wished to develop on the course;
    - Phase 2 = Students in similar time zones were randomly allocated into Example Project groups (12 peers per group) to analyse an existing or real-world fintech venture. There were 91 Example Project groups. While Example Projects were underway, students from across the course were expected to view each other's elevator pitches, vote for their favourites, and then form groups around the top-voted pitches.
    - Phase 3 = Students formed new groups around the top-voted pitches to develop these into Capstone Projects. There were 251 Capstone Project groups (2 - 5 peers per group).

Both projects required groups to work collaboratively to complete weekly deliverables. A once-off peer assessment per project was included whereby group members could rate the contributions made by their peers, for the reasons outlined earlier in this paper, namely to reward individual effort, to increase group member accountability, and to address the frustration of free riding.

REQUIREMENTS

In planning the peer assessment process, we were aware that many students had been complaining about the administrative intensity of other activities on the course. Besides having to learn how to navigate their new Online Campus, students felt overwhelmed by the large sets of instructions they had to follow to complete tasks related to assignment submissions, group formation, the use of collaborative tools, and more.

We realised many of our course activities were too onerous. Therefore, the peer assessment process, above all else, had to be as simple as possible for students; a straightforward exercise that would be easy to understand and quick to complete.

For this reason, the peer assessment function on Moodle (the Learning Management System used at GetSmarter) did not meet our requirements. Moodle's native peer review activity, technically known as its workshop activity, was built for written assignment reviews, and thus involves several consecutive phases, each with different start and end times, and unfamiliar interfaces, which would have required careful consideration to be used effectively. The risk of more confusion and frustration was too high; we needed a smarter solution.

In the interest of simplicity, we set out to find a peer assessment solution that met the following requirements:

- No incremental or ongoing effort - the assessment had to be a once-off task to occur at the end of each project;
- No disclosure of peer ratings - the assessment had to be anonymous to try and prevent bickering and disputes among students, who already had their hands full with project work;
- Sufficient grade weightings - the peer assessment had to be worth enough marks to encourage participation on the projects;
- A single, overall score per student - it would have been too time-consuming to ask student to score each of their peers on several different areas, especially given that Example Project groups had 12 members;
- Generic assessment criteria - since the plan was that each group member would select a single score for each of their peers, the information provided to guide them in making that scoring decision had to be the same for all groups.

METHOD

The following sections outline in detail the steps we followed to implement the peer assessment activity as per the requirements above.

ESTABLISHING PEER ASSESSMENT CRITERIA

We had decided that students would rate each of their peers using a single, overall score. Therefore, instead of answering several questions about each group member, students were provided with a generic set of group work criteria and associated behaviours (Table 1), and asked to score each of their group members based on an overall impression of how well they thought the person had fulfilled the list of behaviours.

CRITERIA	BEHAVIORS
Quality of intellectual contribution	Did the group member make strong evidence-based arguments? Did they offer insight into the problems posed? Did they contribute meaningfully to the final product? Did they help prepare all work in a quality manner?
Quantity of contributions	Did the group member contribute significantly to the success of the project? Did they contribute meaningfully to group discussions?
Participation	Was the group member respectful of group dynamics? Did they contribute and build on the ideas of others? Did they listen as much as they contributed? Did they draw in others and attempt to resolve conflict? Did they demonstrate a cooperative and supportive attitude?
Reliability, responsibility and communication	Did the group member attend group meetings regularly and arrive on time? Did they prepare for team meetings by completing pre-reading or agreed upon tasks? Did they complete follow-up tasks by the agreed-upon deadlines? Did they make an effort to respond to group communication in a timely fashion?

TABLE 1: Group work criteria and associated behaviours.

The use of generic criteria was necessary given the circumstances, though during the early planning phase we did consider using group-specific criteria. The idea was for each student to be assessed on how well they fulfilled the unique roles and responsibilities assigned to them by their group. This approach would likely have increased the validity of the peer rating exercise, since involving students in a discussion of the criteria used, tends to result in a sense of familiarity and ownership of the criteria (University of Florida 2016).

However, procedurally the approach of group-specific criteria would have been very difficult to implement online - especially at the scale we were operating. After all, we were happy with our decision to use generic criteria. Doing so ensured consistency across all assessments, thoroughness in terms of the behaviours being assessed, and accessibility so that it was easy for even the less knowledgeable students to complete (Knight and Steinbach, 2001).

FINDING THE RIGHT TOOL

Given the heavy load of administrative tasks our students were already dealing with, we had to find a tool that was simple and straightforward to use. A further constraint was time; problem-solving other important areas of the course had left us with little time to explore our options for peer assessment and to test a range of tools.

We knew we weren't going to use Moodle's native peer review tool, given that its features did not align well with our objectives. Knight and Steinbach's study to adapt peer review to an online course found similar inadequacies with their Learning Management System, Blackboard. In their study, they found "... little peer review software available for classroom use, with most of what was available either focused on writing assignment review or written by a particular school for its own use" (Knight and Steinbach, 2001).

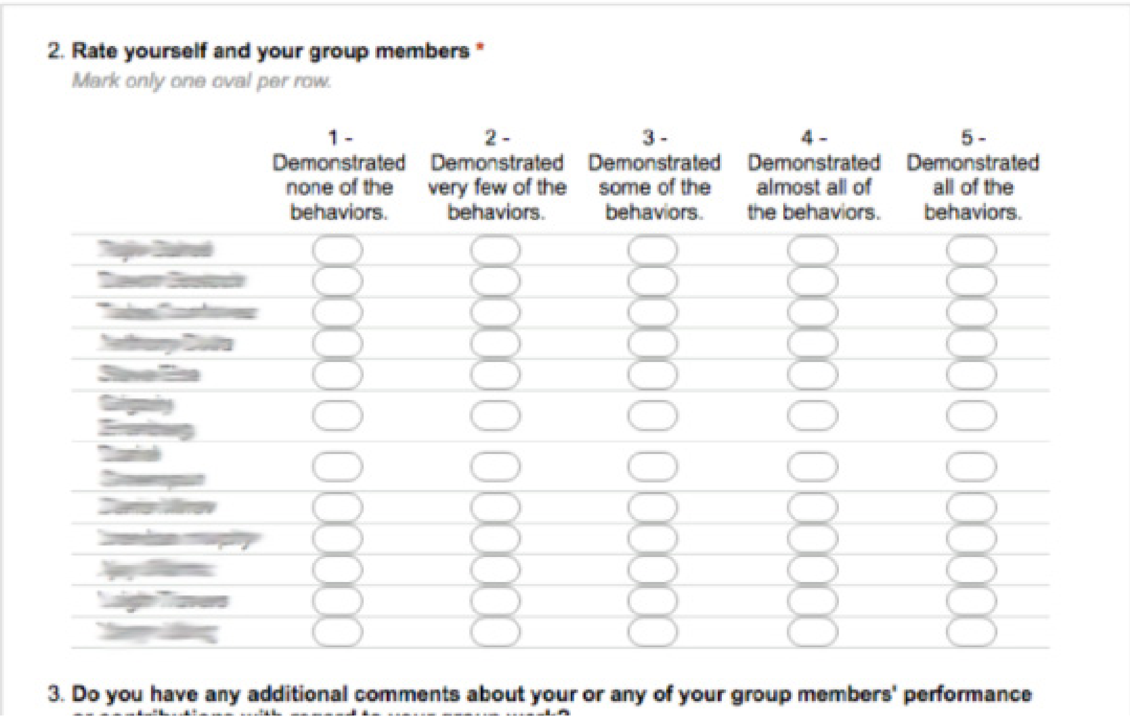
Our most logical alternative to use was an online form, which is what Knight and Steinback also did. We first considered using SurveyMonkey, though we were unsure if SurveyMonkey could scale to support our high student numbers. So we decided on Google Forms instead.

THE CHALLENGES WITH USING GOOGLE FORMS

Below are the three main practical challenges we encountered in using Google Forms as the tool for our peer assessment:

1. Quality assurance

How could we make sure that students inputted the correct data? Without measures to prevent them from misspelling names or adding names of peers who weren't in their group, the data quality would have been at risk, and following up to have those mistakes rectified would have been a nearly impossible task. Initially, we thought to solve this by setting up the forms with drop-down menus that listed the correct names of all 950+ students. This setup would have prevented spelling errors, but there was still the risk that students could select to assess someone that was not in their group. The solution, ultimately, was to create a unique form for each group, pre-populated with the correct student names to remove any potential for error.


2. Rate yourself and your group members *
Mark only one oval per row.

	1 - Demonstrated none of the behaviors.	2 - Demonstrated very few of the behaviors.	3 - Demonstrated some of the behaviors.	4 - Demonstrated almost all of the behaviors.	5 - Demonstrated all of the behaviors.

3. Do you have any additional comments about your or any of your group members' performance

FIGURE 1: The peer assessment form for Example Project groups (names are blurred out to protect student identities).

We created a total of 91 Google Forms - one for each group. As shown in Figure 1, this approach did allow students to score themselves too, which is something we would have preferred to avoid, but to do so we would have had to create over 950 unique forms, which was unfeasible given our time constraints.

2. Directing student to their group's Google Form

Each of the 91 unique forms had its own URL link. A second big challenge was to find a way to direct each student to the form intended for their group. The safest option was to add 91 peer assessment activities to the learning path, each with a link to a different form, and to set activity restrictions so that each student would only see the activity intended for their group.

On the student-facing end, this would have worked out fine - students would have seen only one peer assessment activity, guaranteed to link them to their correct form. On the admin-facing end, however, this setup would have been not only time-consuming to create; it would also have resulted in a clunky system overloaded with essentially duplicate components - an administrative headache.

With this in mind, we decided to utilise Google Drive instead. By storing all the forms in a centralised folder in the cloud, we simply had to include a single peer assessment activity that pointed straight to the Google Drive folder.

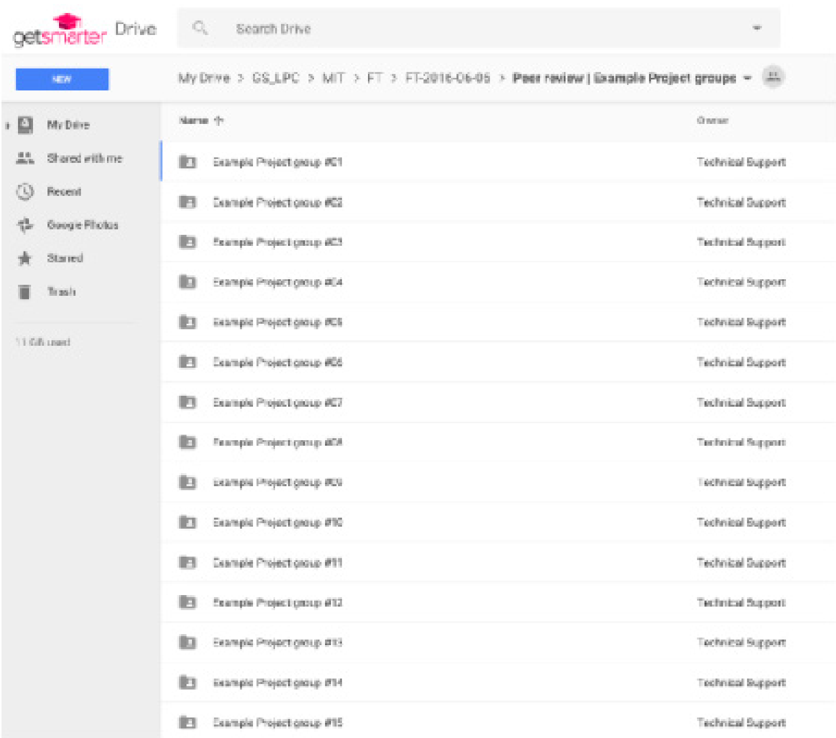
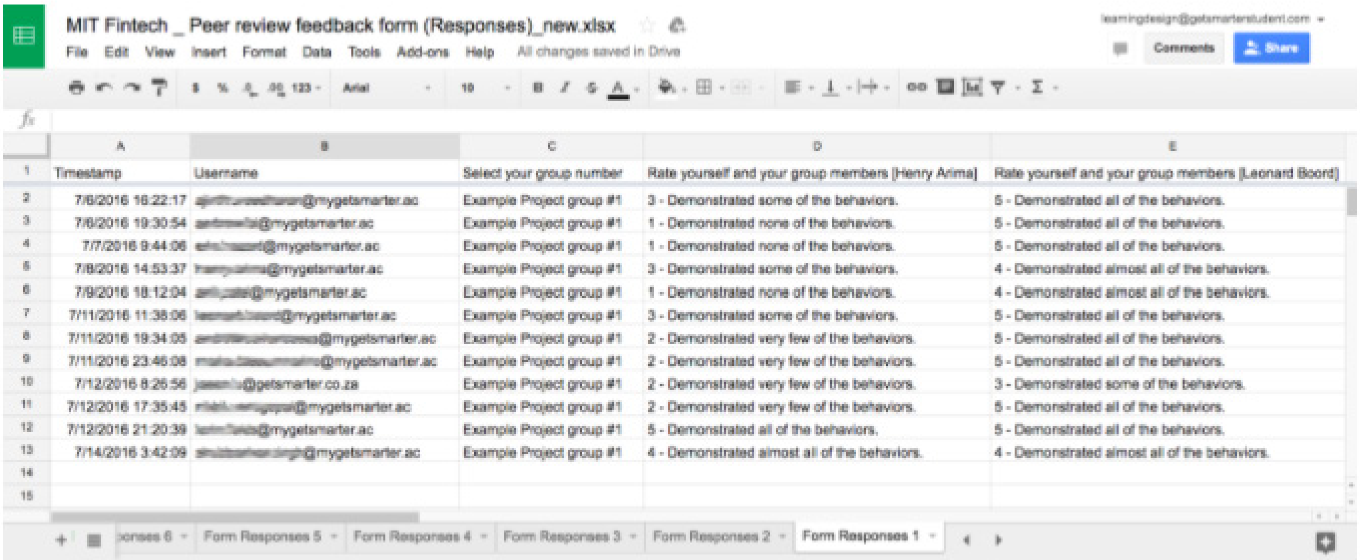


FIGURE 2: The Google Drive folder that housed the forms for all groups.

As shown in Figure 2, we used group numbers to direct students to their forms. This strategy worked well. Even though students could access any of the forms, they were very familiar with their group number, and so we encountered no cases of incorrect form use.

3. Managing the response data and calculating grade averages

When setting up a Google Form, users are prompted to create a corresponding Google Sheet to capture the data inputted and submitted on the form. Ordinarily, each form would have its own response sheet. Having 91 separate Google Sheets would have been difficult to navigate, so we sought to find a way to centralise the response data. Given our time constraints, we were not able to test all available options, so we decided to go with a simple hack that was easy to action: to set up only one Google Sheet but with 91 individual tabs to house the data from our 91 Google Forms.



MIT Fintech _ Peer review feedback form (Responses)_new.xlsx

	A	B	C	D	E
1	Timestamp	Username	Select your group number	Rate yourself and your group members [Henry Arima]	Rate yourself and your group members [Leonard Boord]
2	7/6/2016 16:22:17	[illegible]@mygetsmarter.ac	Example Project group #1	3 - Demonstrated some of the behaviors.	5 - Demonstrated all of the behaviors.
3	7/6/2016 19:30:54	[illegible]@mygetsmarter.ac	Example Project group #1	1 - Demonstrated none of the behaviors.	5 - Demonstrated all of the behaviors.
4	7/7/2016 9:44:06	[illegible]@mygetsmarter.ac	Example Project group #1	1 - Demonstrated none of the behaviors.	5 - Demonstrated all of the behaviors.
5	7/8/2016 14:53:37	[illegible]@mygetsmarter.ac	Example Project group #1	3 - Demonstrated some of the behaviors.	4 - Demonstrated almost all of the behaviors.
6	7/9/2016 18:12:04	[illegible]@mygetsmarter.ac	Example Project group #1	1 - Demonstrated none of the behaviors.	4 - Demonstrated almost all of the behaviors.
7	7/11/2016 11:38:06	[illegible]@mygetsmarter.ac	Example Project group #1	3 - Demonstrated some of the behaviors.	5 - Demonstrated all of the behaviors.
8	7/11/2016 19:34:05	[illegible]@mygetsmarter.ac	Example Project group #1	2 - Demonstrated very few of the behaviors.	5 - Demonstrated all of the behaviors.
9	7/11/2016 23:46:08	[illegible]@mygetsmarter.ac	Example Project group #1	2 - Demonstrated very few of the behaviors.	5 - Demonstrated all of the behaviors.
10	7/12/2016 8:26:56	[illegible]@getsmarter.co.za	Example Project group #1	2 - Demonstrated very few of the behaviors.	3 - Demonstrated some of the behaviors.
11	7/12/2016 17:35:45	[illegible]@mygetsmarter.ac	Example Project group #1	2 - Demonstrated very few of the behaviors.	5 - Demonstrated all of the behaviors.
12	7/12/2016 21:20:39	[illegible]@mygetsmarter.ac	Example Project group #1	5 - Demonstrated all of the behaviors.	5 - Demonstrated all of the behaviors.
13	7/14/2016 3:42:09	[illegible]@mygetsmarter.ac	Example Project group #1	4 - Demonstrated almost all of the behaviors.	4 - Demonstrated almost all of the behaviors.
14					
15					

FIGURE 3: The response sheet, showing data pulled from Group 1's peer assessment form. Note the separate tabs created for each of the 91 groups (names are blurred out to protect student identities).

Having dozens of separate tabs increased the administrative overhead of managing the peer assessment data. Calculating the average scores also proved difficult given how dispersed the data was. Once we had devised a formula to aggregate one group's scores, we had to apply this formula to each of the 91 tabs to calculate the average grade for each individual student. This data then had to be cleaned and prepared in the correct format to be uploaded to the Online Campus grade book.

LESSONS LEARNED: THE FLAWS IN OUR APPROACH

Apart from the administrative intensity of this exercise, we identified in our post-mortem four significant flaws in our approach:

1. Data security

Google Forms (and Sheets) are sharable documents that can be used by others based on specific sharing settings. These settings include the right to view or edit a Google Form. Viewing rights allow users to answer questions on the Google Form (thereby inputting their data) and then to submit their responses. Users with editing rights, however, have the ability to modify questions, and access data in the response sheet.

Managing these settings is relatively straightforward, though we had to be extremely cautious with regard to whom forms should be shared with and on which Google Drive account the forms should be stored. Unsurprisingly, many students clicked to request editing rights from the form owner. Ensuring alignment across our internal support teams was critical to prevent sensitive information from being leaked. The heightened sense of potential vulnerability, and the ensuing need for increased security to protect form data, did put a fair amount of pressure on our course design and tech support teams.

2. Human error

The risk of human error is inherent in the manual handling of data, which was an unavoidable part of our approach. Indeed, there were instances during our implementation process where mistakes slipped through, mostly when applying formulas or cleaning data. Had we used a native Moodle activity, human error would not have been a risk, as data configuration tasks would have been automated.

3. Tracking activity submission rates

A major flaw in our approach was the extensive manual effort that was required to track who had submitted the activity, and who had not. Generating reports to track submission rates for other activities on the course is easy, since our other activities are built using Moodle's native tools. But our peer assessment activity relied on external software - Google Forms and Google Sheets - which meant the only way to track submission rates was to periodically check each of the 91 tabs and write down the names of students who had not yet submitted. This was not a productive use of our course delivery team's time. Still, we needed to find a mechanism to keep count of late submissions. Our best option was to extend the activity deadline and send several course-wide reminder messages (email, SMS, forum posts) until the peer assessment response sheets were sufficiently filled. This strategy prompted most students to respond, though in some groups, albeit very few, the submission rate was still below 50%.

Fortunately, low submission rates did not have an unfair impact on peer assessment grades. To prevent students from being disadvantaged by low group participation, we calculated averages by adding up all the scores a student received, and dividing that total by the number of times they were scored. This approach was, as far as possible, fair and equitable, regardless of the number of peer responses per group, as shown in Figure 4 and 5.

Name													Average
[illegible]	5	3	4	4	4	4	5	5	5	5	4	5	4.416666667
[illegible]	5	4	4	4	5	5	5	5	5	5	5	5	4.75
[illegible]	5	3	3	4	5	3	5	5	5	5	4	3	4.166666667
[illegible]	5	5	4	5	5	5	5	5	5	5	5	5	4.916666667
[illegible]	5	5	5	5	5	5	5	5	5	5	5	5	5
[illegible]	5	3	1	1	1	3	1	1	1	1	1	3	1.833333333
[illegible]	5	5	3	4	4	4	5	5	5	5	5	5	4.583333333
[illegible]	5	5	3	2	4	3	5	5	4	5	4	5	4.166666667
[illegible]	5	3	2	4	3	4	4	4	3	4	4	3	3.583333333
[illegible]	5	5	5	5	5	5	5	5	5	5	5	5	5
[illegible]	5	5	3	4	4	5	5	5	5	5	5	5	4.666666667
[illegible]	5	3	1	1	1	3	1	1	1	1	1	3	1.833333333

FIGURE 4: Average peer grades based on scores from all 12 group members.

Name					Average
[illegible]	1	1	3	1	1.5
[illegible]	1	1	3	1	1.5
[illegible]	5	4	5	4	4.5
[illegible]	2	1	3	1	1.75
[illegible]	1	1	3	1	1.5
[illegible]	5	4	5	3	4.25
[illegible]	2	2	3	2	2.25
[illegible]	3	2	3	2	2.5
[illegible]	2	1	3	2	2
[illegible]	5	5	4	4	4.5
[illegible]	1	1	3	1	1.5
[illegible]	5	5	5	4	4.75

FIGURE 5: Average peer grades based on scores from only four group members.

4. Free-riders

Part of our reason for implementing peer assessment was to address the issue of free-riders. Many students complained about having free-riders in their groups, and they wanted retribution. This had a negative impact on student sentiment. A big source of students' frustration was that the weighting of the peer assessment grade (3.5% of the overall course mark) was too low, and so they did not view the peer assessment as an adequate mechanism for penalising their non-contributing peers. Secondly, many students felt it was unfair that free-riders were allowed to complete the peer assessment; they demanded access to the response data to check that their scores hadn't been sabotaged.

All of this negative sentiment had to be carefully managed to prevent disputes from spilling over onto the class forums and social media sites like LinkedIn or Twitter. Our strategy was to address each student's concern directly to make them feel heard, to recognise that our approach wasn't perfect, and to state clearly our intention and commitment to taking all student feedback on board to improve future presentations of the course, and the peer assessment activity in particular.

NEW PRESENTATION, NEW APPROACH

Our approach to implement peer assessment on Presentation 1 brought about significant challenges. While we managed to run the activity from start to finish with no critical failures, we knew there was ample room to improve the process for Presentation 2, both to deliver a better student experience, and to achieve greater scalability from an instructional design and task administration standpoint.

It was clear that an integrated solution using Moodle's native peer review functionality was our best available alternative. As mentioned previously, this function involves certain additional steps and unfamiliar user interfaces, which is why we did not use it on Presentation 1, given that some of the other course activities had already been very cumbersome for students. Fortunately, as part of our course review process, we were able to effectively streamline all previously onerous activities, and so we were confident that students wouldn't feel confused or frustrated when using the new Moodle-integrated peer assessment tool.

Moodle's native peer review process is built primarily for written assignment reviews, similar to the peer review function on Blackboard, as Knight and Steinbach (2001) point out. As such, the process entails two phases for students: the submission phase to submit a written piece, and the assessment phase for students to review [and assess] the write-ups submitted by their peers.

Based on our requirements for the peer assessment activity on the MIT Fintech course, an individual written

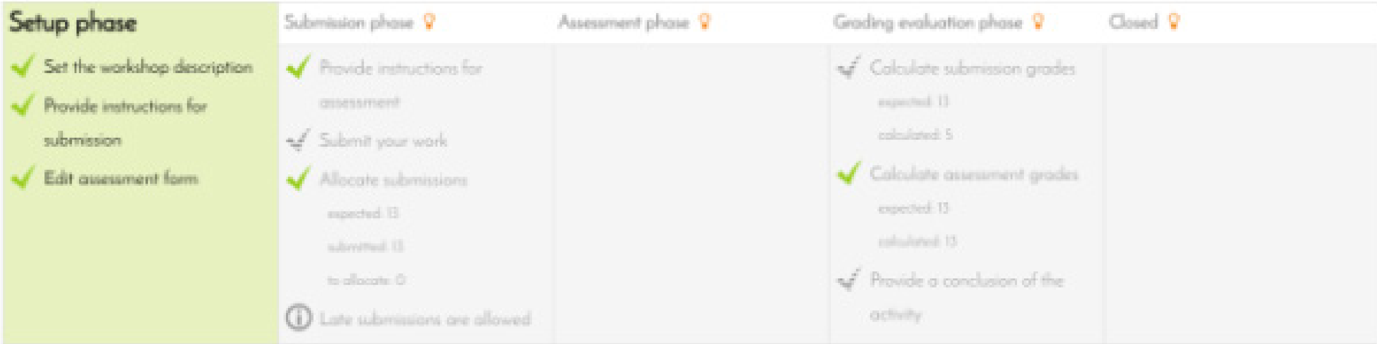


FIGURE 6: The different phases of Moodle's peer review activity, two of which involve students.

submission was an unnecessary step; we only needed group members to rate one another's performance in general. Nevertheless, we decided to use the tool and so had to plan our activity around its features:

1. For the submission phase, we asked students to write a self-review in the form of a 150-word reflection on their own individual contribution to the project.
2. For the assessment phase, all individual reflections were made visible to the rest of the group. Students were prompted to read their group members' reflections and score each of them against the same set of generic criteria that we used before (see Table 1).

Overall, the new peer assessment process proved to be beneficial in several ways. In fact, by using the new process, we were able to eliminate most of the flaws we faced with our approach on the first presentation of the course. These improvements were mainly possible because the new tool was native to Moodle, which meant it was seamlessly integrated with our Online Campus. The benefits of the new approach are listed below:

- Most of the tasks that had to be done manually on Presentation 1, like creating input forms, directing students to their group's form and capturing and managing the response data, could now be automated;
- Task automation not only decreased the likelihood for human error; it also freed up time for our course delivery teams to focus on stimulating student discussions and supporting groups with their projects;
- Given that the new tool did not rely on any external software, there were no issues related to data security or setting of permissions.
- The tool's integration with the Online Campus also meant that activity completion reports were easy to generate as and when necessary;
- Distributed weighting could be assigned to the contribution mark; students received marks based on what their reviewers scored them, and whether or not they scored all their reviewees (see Figure 8).

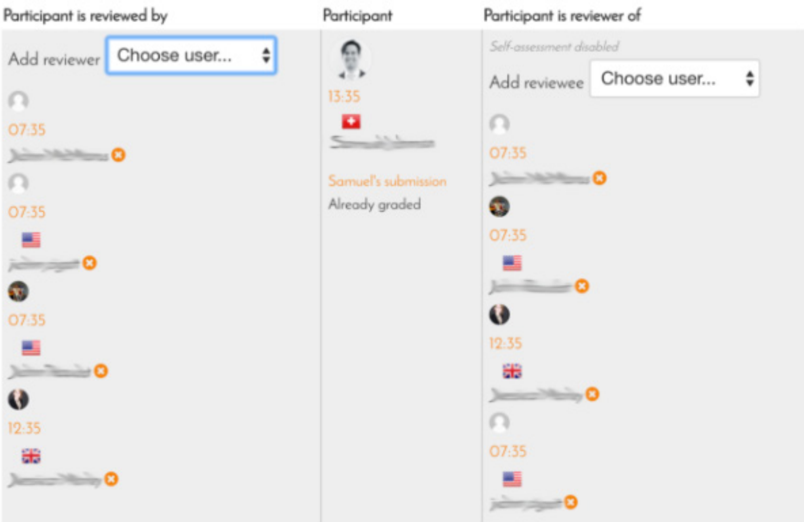


FIGURE 7: Moodle's native peer review tool automatically allocates reviewers and reviewees using group configurations that are already set up on the platform.

Perhaps the most notable improvement in our new approach was that we defined a strategy to identify, confirm and exclude free-riders from the peer assessment activity. At the start of their projects, groups would be required to submit a work plan that outlined the roles and responsibilities that group members had assigned to one another. Most importantly, groups would need to appoint a coordinator to liaise directly

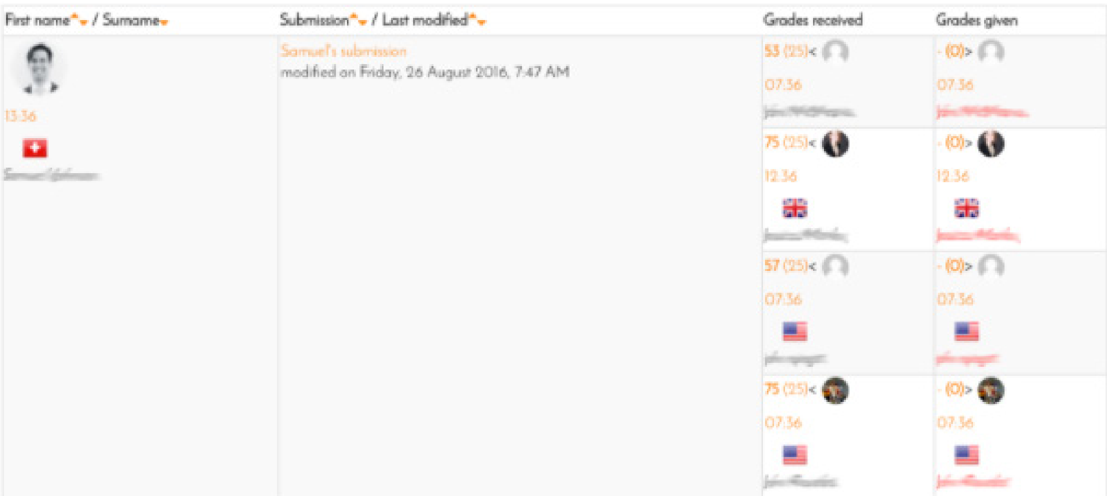


FIGURE 8: The contribution mark had a distributed weighting, that factored in grades received and grades given.

with the course coach on behalf of the group, and vice versa. Through this new line of communication, coaches would be able to contact group coordinators to ask whether there were any free-riders in their group. Coaches would then need to contact the identified individuals to confirm whether or not the allegations were true. Once confirmed, free-riders would receive zero for the relevant project activities and be removed from participating in the peer assessment.

This strategy was planned with the assumption that students would respond timeously to coach calls and emails. However, student responsiveness was lower than expected, and as a result of extended delays, free riders could not be confirmed in time to remove them from the peer assessment activity. All we could do to penalise free-riders was to score them zero for the project activities to which they did not contribute. Overall, this strategy instilled a sense of fairness in our approach to group work and peer assessment that was missing on Presentation 1.

Further research could enable ongoing improvements to this strategy. As we learned, relying solely on people-mediated processes to identify, confirm and exclude free-riders becomes unwieldy on a course with high student numbers. Perhaps these practical challenges could be solved through specialised software that can assist in recording levels of individual contribution per project activity, and to use this as a basis for admitting or excluding students from the peer review process.

CONCLUSION

This paper has examined in detail the processes needed to implement peer assessment in online group projects. The study focuses on the first presentation of the MIT Fintech online certificate: Future Commerce, which was delivered to over 950 students from more than 70 different countries. It unpacks the constraints and requirements that informed the design of the peer assessment, the challenges that arose during its implementation, the lessons learned with regard to the flaws of the selected approach, and the improvements that were made for the course's second presentation.

Given the intricate processes involved in other course activities, the peer assessment activity needed to be quick and straightforward for students. Therefore, the activity was built using Google Forms instead of Moodle's native peer review function, since the latter is built for written assignment reviews which did not form part of our requirements. While Google Forms delivered a fairly smooth student experience, the manual setup and activity management tasks were very time-consuming for GetSmarter's instructional design and course presentation teams.

There were three main practical challenges with using Google Forms: to ensure that students selected the correct names, we needed to create separate forms for all 91 groups; to ensure that students could access the correct form, we had to utilise Google Drive; and, managing the response data and calculating grade averages required extensive manual effort. Through administering the activity, we learned that our approach was flawed in four major areas: the need for additional security measures to protect peer review data; the risk of human error in a largely manual process; the inability to efficiently track activity submission rates, and the lack of a mechanism to exclude free-riders, which negatively impacted student sentiment around the integrity of our approach to group work and peer review.

Comparatively, the approach we took on the second presentation of the course worked a lot better. After streamlining the intricate processes involved in other course activities, we felt comfortable using Moodle's native peer review functionality, despite that it included a submission phase which was redundant in terms of our requirements. Moodle's peer review tool was at least fully integrated with our Online Campus, which meant several admin-heavy tasks could be automated. Furthermore, the new method eliminated most of the major flaws of our first approach.

Still, there exists room for further improvements, particularly with regard to the practical challenges of identifying, confirming and excluding free-riders. Further research and software testing could assist in gaining increased efficiencies in this process.

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