

Peer assessment of recorded student presentations

Alexander A. Kist and Mark Phythian

School of Mechanical and Electrical Engineering, University of Southern Queensland

Corresponding Author Email: kist@ieee.org

Structured abstract

BACKGROUND

Constructive alignment, authentic assessment and developing professional competencies (transferable/non-technical skills) are important issues in engineering education. These challenges have been highlighted by professional bodies such as Engineers Australia and the Accreditation Board for Engineering and Technology (ABET). A wealth of research exists that directly links these issues to student learning. Face to face activities such as seminars, provide on-campus students opportunities to practice these skills. Without similar activities it is often difficult to engage external students in tasks that involve higher order learning objectives (analysis, synthesis, and evaluation) through traditional assignments. While modern telepresence and video conferencing tools allow real-time interaction, these prove ineffective for students who work full time and are located in different time zones. To undertake such activities with external students in an asynchronous way, another learning tool is required. This paper reports on a learning activity that involved recorded student presentations and their assessment by peers in two classes, i.e. a first year introductory course into engineering applications and a third year course covering communication protocols and computer systems.

PURPOSE

The motivation of using peer assessment in these classes was to engage students in tasks that are beneficial to their learning. The research question for the work discussed in this paper is - in what ways do students perceive and approach peer assessment tasks and how this relates to development of their professional identity.

APPROACH

Students in a number of courses use the learning activity to access recorded presentations of their peers. It is demonstrated that the way these tools are used follow the principles of constructive alignment. Students participated in a survey to evaluate their perceptions of the peer assessment activity and its relationship to their professional development. Assessments that students have provided will be further analysed in future research to gain a better understanding of the quality of their assessment.

RESULTS

Feedback indicates that students appreciate opportunities for peer assessment, in particular as it is different from traditional, paper-based learning tasks and assignments. The results show a difference in how students engage with this activity depending on their maturity and year level.

CONCLUSIONS

Involving external students in presentations and offering them opportunities to provide feedback to peers is an excellent way to engage students in reflective activities. There is clear evidence that shows that students have developed their professional identities. Learning activities that allow students to develop their professional identity should be more widely used with both face-to-face as well as distance students.

KEYWORDS

Peer assessment, student seminars, distance education

Introduction

Professional bodies such as Accreditation Board for Engineering and Technology (2011) and Engineers Australia have identified key deficiencies in engineering graduates in the areas of written communication, information literacy, critical evaluation, presentation and lifelong learning skills. All of these are important skills that engineering students have to acquire because these are central to the practice of professional engineers.

Offering students opportunities to practice transferable skills is an important requirement of engineering programs; however, this is particularly difficult in the context of distance education as these generic attributes cannot be learned passively through traditional didactic educational programs (Brodie, 2010). Traditionally, face-to-face activities such as seminars or tutorials provide students opportunities to practise these skills. While modern telepresence and video conferencing tools allow real-time interaction, these prove ineffective for students who work full time and are located in different time zones as these students are not able to participate in synchronous sessions.

The paper focuses on a Moodle module based on a learning activity and assessment strategy which incorporates many of the key activities associated with student seminars and workshops. The main features of the tool include its ability to manage the process, including topic selection, content preparation, capacity for students to perform investigative and background research, discussions, peer evaluation, and reflection. The initial tool has evolved into a comprehensive learning activity in which student activities are constructively aligned and students are encouraged to practise generic skills and build domain knowledge independent of their study mode.

Most of the published literature on engaging students in the process of peer assessment focuses on how well the peer assessment aligns with that of a teacher (Dziedzic, Janissek, & Bender, 2008, e.g.). Although this aspect is discussed in this paper, this research project focuses on how the process of preparation and peer assessment supports students in developing their professional identities. For this purpose, the study contrasts two different ways the learning tool is used.

In a first year course, external students assess three peer presentations on two predefined topics, and in a third year course presentations and peer assessment are part of a more comprehensive background research activity. Common to both activities is that they emulate face-to-face student seminars, by requiring distance students to record and submit their presentations, which are subsequently assessed by their peers. Peer assessment is an important part of this activity as it engages students in the process of honestly assessing the presentation, which requires the students to engage with the course material.

The opportunity to improve engagement with the course materials and allow students to practice these important skills was the key motivation to develop this tool. In the first year course students benefit from being exposed to other students' proposed solutions to parts of a common problem, where-as in the third year course students are exposed to a wider selection topics in the field than would normally be presented as core course material.

This work explores the differences in the way the two cohorts approach peer assessment and how this relates to developing their professional identity. The research question for the work discussed in this paper is - in what ways do students perceive and approach peer assessment tasks and how this relates to development of their professional identity.

The remainder of the paper is organised as follows: the next section discusses how the peer assessment tool is currently being used; this is followed by an outline of the educational framework on which the work is based and the methodology that was employed; the discussions of the results evaluate the findings and the paper concludes by pointing out the relevance of the work in the broader context.

The learning activity and its use

Introduction to Engineering and Spatial Science Applications is a first year course with approximately 300 students studying by distance education (externally) and 60 students attending on-campus classes, in each of two semesters each year. All students have access to the same learning materials including recorded lectures, printed study materials, two text books and other supporting resources.

The course covers the topics of: an introduction to the engineering and spatial science professions, engineering science fundamentals, technical communications and study skills. This interesting mix of course content actually provided the motivation for the assessment scheme and ethos for the course; that of students working collaboratively as colleagues within a company to prepare a design proposal for a closed design problem. The assessment scheme, which focuses on student's engineering science and technical communications, includes three assignments which divide a larger project into three parts, designed to scaffold the student's learning.

The first assignment requires the student to analyse the engineering science of the first part of the project to determine what range of parameters might lead to workable solutions, and prepare a short report. The second assignment requires the student to prepare a technical presentation for a similar analysis on either the second or third parts of the same project, and explain how that section influences or depends on the choices made in another section. The third assignment involves completing the technical analysis and preparing a design proposal. The student benefits from reviewing other presentations as it gives them an opportunity to see other potential solutions to two parts of the design problem and partially verify their own analysis against other students work.

For the presentation assessment, on-campus students present in class and evaluate three other students' presentations. To parallel this experience external students record their presentations using the Power Point record narration feature and submit their recording directly into the tool. External students then use the peer assessment features of the tool to evaluate three other students' presentations.

The tool is used in the following way. During the setup phase the academic configures the two topics (parts of the project) for students to select, a marking rubric is defined and a common deadline is set. The tool is changed into the discussion phase during which students select one topic, then prepare, record and submit their presentation. Once students have submitted their presentations, six presentations are randomly assigned to each participant for peer review. Students can view all of these, but are only required to evaluate three presentations for the assessment. Additional presentations are allocated to ensure that students can view at least one presentation on each section and avoid submissions with viewing problems.

Once all topics have been marked by peers and assessors, the tool is moved into the final reflection phase; students have the opportunity to comment on their results and are encouraged to reflect on their learning while undertaking this activity.

Computer Systems and Communication Protocols is a third year introductory course with about 40 students studying by distance education (externally) and 20 students attending on-campus classes. All students have access to the same learning materials and assignments are the same for both cohorts. In this context, the motivation to introduce this activity was twofold. The intention was to expose students to opportunities to practice generic skills and to cover a broader area of fast changing content.

In the course in the areas of telecommunications, computer systems and networking domain, developments in the field changes what has to be covered constantly and traditional assignments with fixed deadlines offer little flexibility (and lesser relevance) to distance students, especially those who are working full time. Therefore, individual assignment topics with flexible deadlines are offered. For example, in the first four weeks of the semester,

students select a topic such as the National Broadband Network or Intel Microprocessor History. Each topic has an associated deadline and the deadlines are scheduled throughout the semester. This has two advantages for students. It exposes them to 80 cutting edge topics in the field at various levels of depth. It also gives students the flexibility to choose a suitable deadline. This allows students with extensive other commitments to successfully complete the assignment, which is not always possible with fixed deadline.

The tool is used in the following way. During the setup phase at the beginning of the semester, the academic configures topics the student can select and their respective deadlines. Marking rubrics for both reports and presentations are defined. The tool is changed into the selection phase. During this phase students select one topic with a specific deadline. There are enough topics that all students are able to select individual topics. After topic selection is completed, a given number of topics (e.g. 20 out of 80) are randomly assigned to each participant for peer review. The next phase of the tool covers the major part of the activity. Students undertake background research and prepare one presentation and one report. External students record presentation using software that captures their computer screen and records a voice over. On-campus students present their findings in class and these presentations are also recorded. Both, reports and presentations are uploaded to the learning tool.

Students self-assess their submissions and submissions are also peer assessed. Throughout the semester, students assess the reports and presentations as they become available. Once all topics have been presented and marked by peers, the tool is moved into the moderation phase. Using an extensive summary of all results that relate to one student, results are moderated by the academic. This involves checking the feedback that was provided by students and the marks that were awarded in comparison to the average of the assessment. If there is little evidence that the student assessors have done the assessment marks are reduced, if students provide comprehensive and constructive feedback, additional marks are awarded. In the final reflection phase, students have the opportunity to comment on their results and are encouraged to reflect on their learning while undertaking this activity.

Theoretical framework

Brown, Rust, and Gibbs (1994) suggests that students must be able to objectively assess their own learning to develop as lifelong learners. Williams (2008) has a similar view in that graduates must become adept at objectively assessing their own learning to become lifelong learners. Students are expected to become 'reflective practitioners' that have the ability to critically reflect on their own professional practice (Bennett, 1989; Falchikov & Boud, 1989; Schön, 1987). This in turn contributes to their life-long learning skills and the need for these skills will only increase in the future. The acquisition of knowledge and skill cannot be restricted to any particular phase of education and has to continue throughout professional life (Sambell & McDowell, 1998).

In the context of distance education it is difficult to give students opportunities to practice those skills. This is problematic as these generic attributes cannot be learned passively through traditional didactic educational programs (Brodie, 2010). The literature indicates that peer assessment leads to improved motivation and ownership, critiquing, evaluation skills and lifelong learning (Brown et al., 1994). This is particularly relevant for distance students who receive very limited informal feedback and opportunities to interact with other students.

Cassidy (2006) further proposes that peer assessment of students' work has potential learning benefits through encouraging student autonomy and higher order thinking skills. Potential benefits of self and peer assessment are also acknowledged by other in the research community (e.g. Bostock, 2001; Brown et al., 1994). Concrete benefits include improved motivation and ownership, critiquing and evaluation skills. To be able to use those pedagogies with external students, technological support is required. Brodie & Gibbings (2009) enforce this by that suggesting that greater emphasis should be placed on technology-supported tools and techniques to assess context based learning rather than

disempowering learners with strict summative assessments. Independent of the benefits of individual activities, diversified learning opportunities will be beneficial to all students as variation theory suggests (e.g. Pang, 2003).

Reflection is an important part of learning and the learning activity specifically encourages reflection at three points. Self-assessing their own submission while they review the work of their peers is part of this process because it allows students to generate perspective (Boud & Falchikov, 1989). Reflection also occurs when students provide comments as part of their assessment of other student submissions. Kist and Brodie (2011) have demonstrated that the feedback provided by peers includes components of constructive feedback as identified by (Nicol, 2009). This shows that reflection occurs as students provide valid feedback.

Methodology

At the end of the semester, students were asked to participate in the study which has been approved by university's ethics committee. Participants completed a student perception survey of 32 questions and also provided consent to their peer assessment data being analysed. The survey was anonymous, but students had the opportunity to voluntarily provide their student ID to allow the researchers to correlate assessment data with the survey responses. 14 questions were of general nature and about the student background, four questions were about critiquing others, four about the feedback received and six about professional identity and development.

The survey also included four open ended questions:

- Which aspects of this activity worked for you?
- What didn't work?
- What would you change?
- Any other comments?

As an incentive, students had the opportunity to win a \$100 iTunes or book voucher. This paper focuses on the student survey data.

For the first group, 21 out of 200 external students participated in the study. The average age of participants was 29 years and 14 per cent of the participants were female in this group. 71 per cent of students were studying part time as distance education students and 90 per cent of participants were working full-time. 67 per cent of students undertook the course in their first year of study.

For the second group, 24 students out of 59 volunteered for this study. 23 volunteers were male and the average age was 34 years. 58 per cent of participants studied part-time as distance education students. 75 per cent of participants were working fulltime. Approximately 63 per cent of students were in the penultimate or final year of study.

Results

For many questions the results are very similar for both groups; however, there are also significant differences between the responses of the two cohorts. These responses and the open ended questions provide the most insight.

Providing feedback

The question whether student found it difficult to assess the work of others, 23 per cent of the first year cohort responded positive, where-as only 16 per cent of the third year cohort agreed with this statement.

Both groups agreed that assessing the work of others stimulated their thinking: 95 per cent of the first year cohort and 83 per cent of the third year cohort agreed or strongly agreed. A first year student observed that:

Evaluating others' assignments gave me the chance to directly see ways in which I could improve my own work. The evaluations also improved my technical understanding of the assignment work.

Both cohorts agreed that reviewing other assignments helped them to improve this understanding of the topic area: 79 per cent of the first year and 86 per cent of the third year cohort agreed or strongly agreed.

Receiving feedback

Forty-eight (48) per cent of the first year cohort and 71 per cent of the third year cohort believed that the peer feedback was honest and factual; 38 per cent and 70 per cent saw the feedback as constructive, respectively. It has to be noted that the first year cohort was not able to provide comments as part of the feedback, those students were limited to a marking rubric. This was an unintended mistake in configuring the learning tool. There were a number of comments in the first year group that related to the lack of comments.

One student in the first year cohort made an interesting remark the value of the peer feedback:

Although I found evaluating others' assignments myself to be beneficial, I was not really concerned with their feedback. I was only concerned with the feedback of the lecturer/marker, as they were marking my work and thus the most important feedback was given from them in the marking rubric.

In contrast one of the third year students remarked: *"There were aspects of my own work I would change given this (peer) feedback;"* another student commented that he *"was disappointed that there was no lecturer feedback given on the papers."*

Professional identity and development

Both cohorts knew and agreed that critiquing and to provide constructive feedback form an integral part of professional practice and are important skills for practicing engineers. 100 per cent of the first years and 83 per cent of the third years agreed or strongly agreed. In contrast, only 71 per cent of the first year students and 76 per cent of the third year students believed that what they learned undertaking the peer assessment activity is important for their professional practice and will help them in the workplace.

Fifty-eight (58) per cent agreed that undertaking the activity helped them to develop their professional identity as engineers; only 38 per cent of the first year students agreed with this statement.

A key motivation for involving external students in peer assessment is to enable external students to be better able to judge their own work in relation to that of their peers. Under *"Which aspects of this activity worked for you?"* One student that was part of the first year group observed:

As an external student it is hard to know how you're going when you can't compare your progress to your peers. This assessment gave me an opportunity to see where I fit in with my peers and to judge my progress with reference to the progress of (some of) my fellow class mates.

Forty-eight (48) per cent of other respondents in this group made similar observations. One student also highlight that *"the evaluations also improved my technical understanding of the assignment work"*.

The third year cohort made the following remarks: Two students highlighted the flexibility that they could *"assess at a time suitable for me"*. One student stated that *"feedback is vital in professional development and great to see in a uni course."*

Another key aim of using peer assessment was to encourage students to learn about other topics and engage with the subject material. One student remarked that *"if it wasn't mandatory I may have never read half on them."*

Many of the comments to the open ended question in the survey were either of administrative nature, e.g. “*make presentations easier to locate*” or about changes to the interface “*due dates shown in the calendar*”, “*a comment section could be added for each aspect of the criteria rather than overall.*”

Findings

Overall, the results paint a consistent picture of the level of engagement of the students; depict the low response rate of the first year cohort of only 11 per cent. Some of the differences between the cohorts are likely to be due the different ways the tool was used in both courses. However, there are indicators that demonstrate that students have developed a better skill set. It is planned to further investigate this by analysing the feedback comments and the assignments that the students have provided. This will allow triangulating the results with another data set. In the future it is also planned to include an additional professional practice course in the evaluation.

Overall, the first year cohort appeared to see the value of peer assessment and how this relates to professional development; however, the third year cohort was more vocal about the positive aspects of this learning activity:

Love the engagement of this subject and as an external this makes study so much more valued, directed, supported and ultimately SUCCESSFUL. Thank you.

I wish more courses used this methodology. A pleasure to participate and stark contrast to other courses (...) that I have been experiencing recently.

This might be partly due to the broader experience with university teaching but also the more comprehensive, independent use of the learning activity.

Based on the existing literature on peer assessment and the results of this study, it can be concluded that emulating student seminars with external students is a good way to achieve learning outcomes in regards to developing a professional identity, being able to place their own work and skills in the context of their peers, and to practice communication skills. These outcomes are not specific to external students and also apply to traditional face-to-face students.

An important aspect of the presentation and peer assessment activity in both courses is how they link closely with the course content and are not just an ‘accessory’ to get students to ‘do an oral’. For example the presentations in the first year course contribute to the collaborative process of solving a larger problem. Hence the students see greater value in preparing, presenting, assessing and providing feedback to their peers, which in turn leads to better engagement with the course content.

Conclusions

This study has investigated seminar style activities undertaken by mature age distance education students using recorded presentations and peer assessment. Both, a first year introduction to engineering course and a third year computer systems and networking course were investigated. The study was based on a response rate of 11% and 41% from the two courses, respectively.

The study has shown that a high proportion (>90%) of respondents found this activity stimulating and all agreed that critiquing and providing constructive feedback form an integral part of professional practice and are important skills to develop. The concept that the activity helped them to develop a professional identity is, perhaps predictably, more tangible to the third year cohort (58%) than the first year cohort (38%).

Students responded positively to the opportunity to contextualise their presentation into a professional setting and being able to reference their own work against that of their peers. Requiring external students to prepare and submit a recorded presentation not only gives

them a similar experience to on-campus students, but encourages students to develop skills they recognise as directly relevant to the practice of their profession.

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