Peer assessment of assignments – the USQ experience

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Abstract: High quality and timely feedback on assignments is considered imperative in the learning process. Providing feedback on an assignment requires considerable time and effort on the academic's part. Yet, the effectiveness of feedback depends largely on the student's decision to both absorb and apply it. In fact, anecdotal evidence suggests that most students give insufficient attention to reviewing assessment feedback irrespective of its quality, quantity, and/or timeliness. This suggests the feedback mechanism of assessment items has questionable effectiveness in student learning. Peer assessment of assignments is one system that could potentially improve the learning effectiveness for students. In this system, each student is required, as part of assessment, to review and comment on peer's assignments. This system has been trialled at USQ in a 2009 course with a large distance student cohort. Here the authors describe the steps involved in peer assessment, summarise the work in progress, and discuss preliminary results. The authors also highlight the importance of the peer assessment system in improving students' learning at an institution with a large distance student cohort. This paper reports only the initial part of the study since final results were not to hand at the time of the preparation of this paper.

Introduction

Assessment refers to tasks assigned to students by their course instructor that are to be completed outside of the classroom setting within a stipulated time. Written assignments accompanied by a grade are often used as assessment in higher education institutions. Assignments are designed to reinforce and test understanding of the theoretical concepts covered in the course while linking those concepts with their practical applications.

Conventionally, assignments submitted by students are marked by an assessor within a given time period and returned to the student with feedback. The purpose of the feedback is to help students to improve their future work while passing judgement on the quality of their current work. Therefore, timely and well-focused assignment feedback is meant to greatly enhance student-learning experiences (Brown, Race & Rust 1995). There are different ways of providing assignment feedback. The common method used in most higher education institutions includes hand written comments jotted on the relevant assignment pages of a student's individual work. A marking rubric that indicates the level of achievement against predetermined criteria could also be used in addition to, or instead of, the hand written annotations on student submissions.

So, assignment feedback is there to help students with their learning. However, anecdotal evidence from teaching staff reveals that assignment feedback is poorly used by the majority of students. There is also evidence that many students do not collect and/or review their marked assignment. Thus, devising an effective method of communicating the required range of assignment answers through better feedback mechanisms is essential to make the mastery of a knowledge area more effective.

Attempts are being made at various educational institutions to overcome these lapses through implementation of alternative marking practices such as the use of peer assessment system (e.g. Bloxham & West, 2004; Prins et al, 2005; Draaijer & van Boxel, 2006; Loddington et al 2009; Willey & Gardner 2009). In educational settings, it is generally agreed that receiving feedback about their work and giving feedback about a peer's work would provide students with an insight into their own efforts while instigating the feeling of belonging to a learning community. Therefore, a peer assessment system is often used to provide students with the opportunity to read, carefully consider, and comment on the work of their peers, while comparing with their own work. It is frequently argued that peer assessment is a system that provides increased understanding of the learning content, helps develop assessment and constructive criticism skills, promotes critical thinking, and allows reflection on one's own performance (Draaijer & van Boxel, 2006; Prins et al. 2005; Bloxham & West 2004; Magdeline et al. 2007; Chapman, 2009). Therefore, the application of a peer assessment system is being trialled in one of the current courses offered in both on-campus and distance modes at the University of Southern Queensland (USQ).

Objective & Research questions

In view of the potential benefits of peer assessment, the implementation of this system is expected to provide better learning experiences to students with improved learning outcomes. However, this hypothesis needs to be validated for a given learning environment. Therefore, the objective of this study is to investigate the learning effectiveness of a peer assessment system in both an on-campus and distance learning environment to answer the following key research questions (RQ).

1. *Student reaction*: How would students react to the peer assessment system? Would they find this system useful?
2. *Student performance*: How would students perform with the help of the peer assessment system? Would it contribute towards improvement of their understanding of the course material?
3. *Student experience:* How useful would be the peer assessment system as a learning tool? Would they find it helpful in their learning journey?
4. *Student interaction:* What difference would the peer assessment system make in student interaction? Would it instigate them to interact with fellow students via a (electronic) discussion forum?
5. *Peer feedback:* How useful would students perceive feedback from their peers?
6. *Student suggestion*: Would students recommend future use of the peer assessment system with some modification? What changes would students suggest if any?

Research methodology

Peer assessment is a sequential process requiring completion of several major and minor events in a logical sequence. Therefore, the research methodology covering a number of different steps has been subdivided into three main stages – preparation, data acquisition, and data analysis stages and largely employs an action research methodology.

Preparation stage

Course and assessment item

Geographic Information Systems (GIS1402) is a course offered at USQ. Most students enrolled in this course are in a distance mode. In semester 2, 2009, the ratio of on-campus to distance students has been about 1:7. Three assessment items are used in this course including a written assignment, an online quiz, and a closed book examination. The written assignment was selected for a trial of the peer assessment system involving voluntary participating students. Seven questions covering about one-half of the course content form the basis of this assignment. Each question is composed of sub-questions requiring separate short answers as guided by the marking rubrics provided. The assignment is worth 30% of the total marks for the course with 17.5% allocated to answering assignment questions, and 12.5% allocated to completing the peer assessment element. Student who chose not to participate in peer assessment were offered and equivalent alternate assessment (Figure 1).
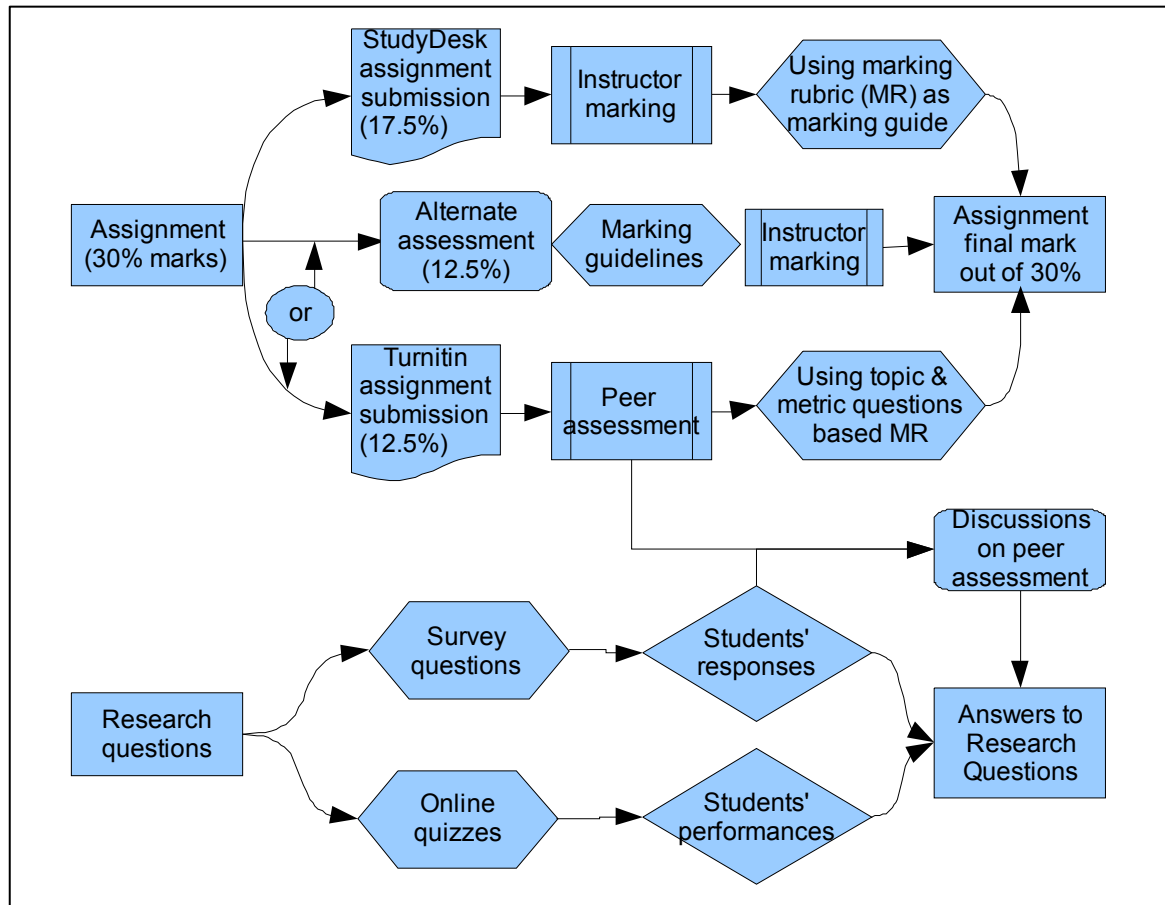
Figure 1 Assessment and research process

Learning Management System (LMS)

Moodle is the LMS used to host courses on the USQ*StudyDesk.* All USQ courses, regardless of their delivery mode have a 'presence' in the USQ*StudyDesk*. The USQStudyDesk did not offer the required 'peer assessment' functionality. Therefore, other LMS such as Electronic Peer Review by De Raadt et al. (2005), Moodle Workshop, and Turnitin (peer review) systems were examined. Since, the Turnitin (peer review) is specifically designed for the purpose of peer assessment it was adopted for peer assessment in this course. Thus, both LMS (i.e. StudyDesk and Turnitin) were utilised simultaneously (Figure 1).

All necessary resources for students to initiate the assignment such as: assignment questions and instructions, assignment template, and marking rubrics were made available via StudyDesk for downloading. The Turnitin system, on the other hand, was setup to accept uploaded assignments, automatically allocate two assignments to each student for peer review, and perform peer review of assignments using the marking rubric provided.

Assignment submission

An assignment template, allowing only the USQ student numbers to be entered, was used by students to submit their written assignment. This was necessary to ensure anonymous peer assessment. Students submit assignments in duplicate in electronic format with one copy via the USQ StudyDesk for the instructor assessment and a second copy on to Turnitin for peer assessment (Figure 1).

Instructor assessment

Student answers to the assignment questions were marked by the instructor with the aid of a marking rubric that captured the marking criteria set in the marking rubric (refer Appendix A). The marking rubric utilised five different quality levels starting from very poor (0-30%), limited (30- 50%), satisfactory (50-60%), good (60-80%) to excellent (80-100%). The instructor assessed the assignment

items electronically on the StudyDesk while providing quality feedback to students via the completed marking rubric.

Peer assessment and its evaluation

Student peer assessors assessed two randomly allocated assignments within the Turnitin system using a marking rubric containing topic and metric questions. Each assignment question required answering several topic questions and each assignment required answering one metric question. The responses to topic questions provided descriptive comment about the quality of the answer while the response to the metric question provided an overall rating of the assignment on a scale of 1 to 5. The instructor evaluated peer assessment work on the basis of the responses provided to topic and metric questions and awarded up to 12.5% marks allocated for this task.

Moderation process

Moderation involved two separate processes. Firstly, it involved comparing assignment marks awarded by the instructor with those of the peer assessors' ranking and reassessing those assignments that were not concordant. This process resulted in a final mark for the first part of the assignment carrying 17.5% marks. Secondly, it involved comparing peer assessment work with the alternate assessment set for non-participating students. This process resulted in a final mark for the second part of the assignment carrying 12.5% marks.

Data acquisition stage

Data addressing six research questions was acquired on completion of the assignment assessment process. Prior to the data acquisition process, the medium necessary to acquire the data, the tasks to be completed, and the research questions to be asked were identified as shown in Table 1 below. Data were acquired using the three different methods: online quizzes, online survey, and discussion forum.

Table 1 Data acquisition mechanism

Research Question	Necessary medium to answer the research question	Tasks to be completed and a question to be asked via survey questionnaire
RQ 1 Students' reaction	Students' discussions on peer assessment system and their responses to the survey question.	Setup of discussion forum. Survey question: What do you think about the peer assessment system in general?
RQ 1 Students' performance	On-line quiz results. Discussions on peer assessment system and students' responses to the survey question.	Conduct online quizzes. Setup of discussion forum. Survey question: Has peer assessment system helped to improve your understanding of the course material?
RQ 2 Students' experience	Students' discussions on peer assessment system and their responses to the survey question.	Setup of discussion forum. Survey question: Do you find peer assessment system a useful learning tool in your learning journey?
RQ 4 Students' interaction	Students' engagement in peer discussions and their responses to the survey question.	Setup of 'peer discussion' forum. Survey question: Did peer assessment system instigate you to interact with fellow students?
RQ5 Peers' feedback	Student's comments and concerns about peer assessment via forum discussions, e-mail, and responses to the survey question.	Setup of discussion forum. Open e-mail communication with students. Survey question: What do you think about the usefulness of the feedback from your peers?
RQ6 Students; suggestion	Student's suggestions via e-mail, online discussion forum, and online survey question.	Setup of discussion forum. Open e-mail communication with students. Survey question: What improvement (if any) to peer assessment system do you suggest?

Online quizzes

Two slightly different sets of online quizzes, based on 10 multiple-choice and 10 true or false type questions, were developed from the course materials covered by the assignment. Quizzes differ slightly to avoid a repetition effect on student performances. The first quiz was conducted soon after the assignment submission, the second quiz after the completion of peer assessment. Students completed these quizzes voluntarily. Class scores achieved in these quizzes by participating students were analysed to infer differences in performance before and after the peer assessment.

Survey questionnaire

The student survey questionnaire was developed to address the research questions (see Table 1). Likert-scale type survey questions were used. In a typical Likert-scale question, participating students are asked to answer how much they agree with the issue of concern in a scale of one (strongly disagree), two (disagree), three (not sure), four (agree) to five (strongly agree). Likert-scale based questions were expanded to accommodate brief written explanations about their choice of answer. A survey questionnaire was made available online soon after the completion of peer assessment. It remains open until end of the semester.

Student discussion forum

An anonymous and open electronic discussion forum was setup for students' discussion on peer assessment. Students were encouraged to express their thoughts and feelings about peer assessment without fear of any consequences. The discussion forum was made available before the commencement of the peer assessment and it was left open until the end of the semester. Students were reminded from time to time to contribute towards the discussion. The outcome of the discussion forum was not intended to directly answer a particular research question but it was expected to provide validation and valuable supplementary information.

Data analysis stage

The data analysis focused on two (i.e. numerical and text-based) categories of data. Analysis of numerical data covered the assessment of student performances before and after the peer assessment event. This analysis involved tracking the change in student performances between the two quizzes. The numerical analyses also encompassed the assessment of the overall change in class performance in this course as compared to the previous two years. Data analysis employed descriptive statistical indicators such as mean and standard deviations as well as paired t-test to infer differences.

Survey data were divided into quantitative and qualitative data types for the purpose of analysis. Quantitative data collected via Likert-scale type survey were analysed as ordinal data. Survey responses were collated using bar charts. A central tendency and a weighted average were determined and the dispersion was measured using quartiles.

Qualitative data is still being collected as part of this investigation and it includes; online survey questionnaire, students' discussions on peer assessment as well as students' e-mail correspondence with the instructor. Students' discussions and e-mail feedback are to be summarised qualitatively. The result is to be expressed in a tabular form to show total number of comments subdivided into comments against, for, and neutral towards peer assessment. Suggestions and comments, added by the students in the survey questions, discussion forum, and e-mail correspondence are expected to support the answers to some of the research questions.

Preliminary results & discussions

Development of assessment items

The focus at the early stage of this research was to develop assessment items. Consequently, the assignment based on seven composite assignment questions, clear marking guidelines, assignment template and a comprehensive marking rubric (Appendix A) were developed. The basis for creating these documents included such factors as; relevancy of the study materials in answering assignment questions, clarity of instructions for the same purpose, a clear mark allocation guide and confidentiality of the assignment for the purposes of peer review were all taken into account. Since,

marking rubrics are considered one of the most critical tools in preparing students for peer assessment (Orsmond, 2004) special emphasis was placed on comprehensive preparation of this document.

Course result history

In view of the potential benefits of peer assessment, the implementation of this system is expected to provide students with improved learning outcomes. One of the prevailing methods of assessing learning outcomes is student performance and final grades in the course. Therefore, the performance of the students studying in this course for last three years was examined. It was found that the overall passing rate was between 70 to 85% in the course (refer Table 2). The percentage of students achieving top grades has been consistently below 10% while failing rate varied from 15 to 30%.

Table 2 Historical student performance in GIS1402 course

Year	Percentage of students receiving				Percent passed	Percent failed	Student number
	HD	A	B	C			
2006	9.1	14.8	25	21.5	70.4	29.6	88
2007	7.9	22.2	21.4	28.5	80	20	126
2008	7.1	31.9	34.3	12.4	85.7	14.3	169

Preliminary student survey results

The student survey on peer assessment is still in progress, however, preliminary results available at the time of the finalisation of this document are summarised in Table 3 below for 44 student responses.

Table 3 Preliminary peer assessment survey result

Survey questions - students' views towards peer assessment system	high ⟵————Agreement (%)————⟶ low				
	5	4	3	2	1
Do they like the peer assessment system?	18	48	11	14	9
Did it help them in understanding course material?	20	41	7	27	5
Do they find it a useful learning tool?	25	48	2	25	0
Did it instigate them to interact with peers?	2	9	5	77	7
Do they find peers' feedback useful?	12	52	9	25	2
Do they suggest future use with improvement?	39	18	29	7	7

The preliminary result revealed that majority (>60%) of the respondents were in favour of the peer assessment system. They find it a useful learning tool to reinforce understanding of the course material. They also find the feedback from their peers useful. So, they recommend future use of peer assessment system with some modifications. In many cases, the opportunity provided by the peer assessment system to compare their own work with their peers' was reported as beneficial.

However, most respondents (>77%) were united in the view that peer assessment system would not play any part in instigating them to interact with fellow students. They were not prompted to discuss the peer assessment issues with fellow students via course discussion forum. A majority in this group reported that there was no requirement to interact with fellow students and develop a learning community.

About 23% of the respondents did not like the peer assessment system and they were firm in their belief that this system would provide no learning benefit to them. They were particularly concerned about the influence of peer marking on their grade, even though they knew that would not be the case. Respondents in this category were not interested in peer's comments and most of them were not ready to accept peers' marking. They did not consider their peers sufficiently qualified to assess their work.

Conclusions

Providing assignment feedback requires considerable time and effort on the academic's part. However, the ultimate effectiveness of such feedback may depend on the student's decision to both absorb and apply it. Therefore, enhancing and refining feedback is an important issue. A peer assessment system

is often used to provide students with the compelled opportunity to read, carefully consider, and comment (provide feedback) on the work of their peers, while comparing it with their own work. This system is being trialled at USQ in a Geographic Information Systems course with a large distance student cohort in semester 2, 2009. The trial has been setup to answer a number of key learning issues including improvement in students' performances through peer assessment system, usefulness of peers' feedback, and students' learning experiences including interactions with fellow students. In this work in progress, learning management systems for smooth running of peer assessment system were developed and several assessment items required for this task (e.g. assignment, marking guide, assignment template, and marking rubrics) were developed. The preliminary survey responses from the peer assessment participants indicated that majority (>60%) of them were in favour of the peer assessment system. They find feedback from their peers useful and suggest future use of this system with some modifications. However, a high percentage of respondents (>77%) clearly indicated that this system would not increase their interaction with fellow students and they did not favour, as distance students developing a learning community. About 23% of the respondents were clearly not in favour of the peer assessment system.

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APPENDIX 1

Marking rubric for Assignment 1

Assignment Identification Number or Name: **Total available marks: 175**

Levels based on marking guide ⇨		Level 1	Level 2	Level 3	Level 4	Level 5	Marks
Question no. & relevance ⇩	**Questions ⇩**	**0 – 30 %**	**30 – 50 %**	**50 - 60 %**	**60 - 80%**	**80 -100%**	
Question 1 **Related to introduction to GIS that refers to Chapter 1 of the textbook** **(25 marks)**	*Describe the main components of a GIS (7 marks)*	0 to 2.1 marks ☐ No or incorrect component identification	2.1 to 3.5 marks ☐ Listing only or description of some components only	3.5 to 4.2 marks ☐ Correct description of most components but not all	4.2 to 5.6 marks ☐ Correct description of all components but no reference	5.6 to 7 marks ☐ Correct description of all components with reference correctly cited	
	Identify and describe the functional elements of a GIS (18 marks)	0 to 5.4 marks ☐ No or incorrect identification of functional elements	5.4 to 9 marks ☐ Listing only or description of some elements only	9 to 10.8 marks ☐ Acceptable description of most functional elements	10.8 to 14.4 marks ☐ Correct description of all elements but no reference	14.4 to 18 marks ☐ Correct description of all elements with reference correctly cited	
Question 1 comments:							
Question 2 **Related to GIS data that refers to Chapter 2 of the textbook** **(25 marks)**	*Discuss the differences between spatial and attribute data types. (5 marks)*	0 to 1.5 marks ☐ No or very poor differentiation of data types	1.5 to 2.5 marks ☐ Differentiation that fails to clearly identify main point	2.5 to 3 marks ☐ Fairly satisfactory differentiation that lacks explanation	3 to 4 marks ☐ Clearly articulated differentiation, but without reference	4 to 5 marks ☐ Clearly articulated differentiation with reference correctly cited	
	Describe the topology environment. (5 marks)	0 to 1.5 marks ☐ No or incorrect description	1.5 to 2.5 marks ☐ Confusing description	2.5 to 3 marks ☐ Partially correct description	3 to 4 marks ☐ Correct description but no reference	4 to 5 marks ☐ Correct description with reference correctly cited	
	Differentiate vector and raster data structures in terms of the ... ... (refer question for details) (15 marks)	0 to 4.5 marks ☐ No or very poor differentiation between data structures	4.5 to 7.5 marks ☐ Differentiation that fails to address all four issues (points) identified in the question.	7.5 to 9 marks ☐ Complete but not clearly articulated and/or explained differentiation	9 to 12 marks ☐ Complete & very well articulated differentiation but without reference	12 to 15 marks ☐ Complete & very well articulated differentiation with reference correctly cited	