Web Based Peer Assessment: a Case study

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Abstract:
The work described in this paper is concerned with the design and practice of web based peer assessment using a Learning Management System (LMS). The peer assessment study involved computer science engineering students at our University. It was conducted as part of a conceptual programming course. Reporting on our first practice, the paper identifies benefits for learners and uses the results we obtained to highlight a few key challenges related to web-based peer assessment.

1 Introduction

Assessment in educational environments is a process of drawing reasonable inferences about what learners know on the basis of evidence derived from observation of what they say, do or make in selected situations. Particularly in conceptual programming courses, students learn the logic and skill of good design through examples. Students often play the role of a self-directed learner. The course is usually taught in a passive environment with generalized lecture material and conceptual assignments are graded with limited feedback. Teachers are therefore asked to provide personalized and detailed feedback to students. By using peer assessment in such course, the student will get an extensive feedback on his/her work and involve him/her in the review process.

Considering the fast development of online learning, we propose to examine an opportunity to improve web-based peer assessment using a LMS. We describe a teaching experiment in which a group of fifty students participated as part of their course on Unified Modeling Language (UML). The paper is structured as follows: In section 2 we provide a general overview of challenges associated with peer assessment. Section 3 illustrates our web-based peer assessment study. In section 4 we discuss the results obtained. Concluding notes and a statement our future work will be provided in section 5.

2 Peer assessment challenges

Peer assessment is not new idea in higher education [3] and can be considered as a tool for the learner to appreciate the characteristics of quality work by evaluating the work of his/her peers. Learners should nonetheless be aware of the assessment criteria to be weighed off and have a clear understanding of what they should look for in their peers' work. The teacher must explain expectations clearly to them before they begin. Peer assessment permits the developing student knowledge and competences and can [1], [10]:

- involve students in cognitive tasks and improve understanding of course objectives;
- highlight the importance of presenting work in a clear and logical way;
- expose students to a variety of techniques, ideas and abilities;
• promote social and professional skills.

3 Peer assessment case study

3.1 General context

The aim of this work is to analyze the benefits of peer assessment in the teaching of a UML course. We have identified several common problems that students encounter while learning UML. They include the following:
• The object-oriented nature of UML is rather difficult for many learners to assimilate.
• Many information systems that the student would like to express with UML diagrams are difficult to compose or comprehend.
• It is difficult for students to differentiate between static and dynamic diagrams and identify the context of use of each type.

In order to set up this online study, an exercise has been initially created by the tutor using Moodle [7]. The tutor sets up a bank of surveys. Each of these surveys corresponds to a criterion with a reference weighed mark ranged from 1 (very poor) to 5 (very good). Once the exercise, marking scheme, and criteria have been created in the LMS, the tutor presents the learner with the exercise.

3.2 Peer assessment methodology

Our study has been split in two phases of one week each. In the first phase, students were divided in two groups of 25. The first group reviewed four projects, while the second reviewed three projects using the assessment criteria announced previously. Once the students were presented with the project, they connected to their PCs and sent their feedback using their access parameters on the LMS. The assessment scheme was composed of 8 surveys related to criteria summarized in Table 1. The learners were observed during this experiment by a lecturer on the course. Verbal communication was initiated to get instant feedback from the students once the presentation of the reviewed project finished.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Questions</th>
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| Criterion 1: Analysis of needs | A1: Clarity in the structure and scheduling of the project  
A2: Quantification and hierarchy of requirements |
| Criterion 2: Design with UML | C1: Conformity of the Use Cases diagrams with the requirements announced in the statement of conditions.  
C2: Conformity of the sequences and Collaboration diagrams with the established use cases  
C3: Level of details in modeling with the Class diagrams (methods, structure of data, attributes, associations, multiplicity).  
C4: Dynamic modeling of certain objects (State transitions diagrams and Activity diagrams) |
| Criterion 3: Presentation of work | PR1: Clarity in the contents and structuring of the talk  
PR2: Clarity and precision in answers to questions |

Table 1: Assessment criteria

Regarding the second phase, we have edited two aspects of our peer assessment strategy; first we have limited the number of assessment criteria to the three main criteria related to the establishment of the main diagrams (C1, C2 and C3). In addition, we distributed to the students a document listing these criteria and invited them to take notes on that document. Once the teaching session was finished we gave the students two days to connect to the LMS and register their feedback on the available surveys.
3.3 Results and analysis

All students completed and returned their answers on the presented surveys related to seven projects (Figure 1). In order to compute a project grade, we have averaged the individual grades from the fifty reviewers. Each individual grade is obtained through addition of the mark given to each criterion. The individual grade is then presented as mark over 20. The comparison between grades given by students and grades given by the teacher show a large gap for the first four projects. This can be explained by the fact that assessment criteria were not well understood by the learners at the beginning of the experiment. Moreover, we clearly see that for the majority of projects, the grade given on average by the learners is higher than the grade given by the teacher, except for the seventh project. This can eventually be explained by the fact that this was the last project that was, and that learners became more familiar with the assessment criteria by the end of the experiment.

![Figure 1: Comparison of results Peer assessment 1st phase](chart1.png)

Concerning results from this second phase (Figure 2), we see that the gap between teacher and student grades is not large, despite the fact that student grades are still higher that teacher’s grades. Since this second phase was tested in the week following the first phase, we can infer that the student acquired higher proficiency in handling the assessment criteria and were able to detect errors and problems in the projects under review.

![Figure 2: Comparison of results Peer assessment 2nd phase](chart2.png)

A final observation is related to the grades given by the students, which were very close. This can be explained by the fact that there was no competition between students.

4 Discussion

Some useful peer assessment systems have already been developed in many fields, for example OASYS (On-line Assessment SYStem) [2]. According to [9] peer assessment is advantageous as it offers the opportunity for students to teach and learn from each other. It can take several forms, but the one described in this work allows a student’s submission to be reviewed by a number of peers. The whole process has been supervised by the teacher. This type of assessment allows students to evaluate the work of others which require higher order cognitive skills through a review of the work of peers and a reflection on their own work and improves consequently the learning outcomes [5]. In our previous work we have mainly...
focused on individual assessment [4]. In this study we faced issues related the use of the LMS. The first problem is that the assessment cannot easily be done anonymously, as there is a log-in process that identifies the submitter. A possible solution consists in creating many generic accounts that would allow multiple students to log into the LMS and submit their reviews. Another problem is related to the way of building of the survey. Each assessment criterion expressed in the form of a question has to be entered separately by hand. In case of many questions, the construction of surveys would be a tedious task.

Another practical challenge resides in the fact that the tutor had to explain many times the peer assessment exercise before involving the students. One possible solution would be to organize a practice session with a sample conceptual project. The students will then determine the assessment criteria. At the beginning of the exercise the tutor encouraged the students to undertake this new experiment, which we consider to be a critical step in order to guarantee the success of such an assessment process. Indeed students must trust each other and provide an objective feedback. Another way to motivate learner would be also to adopt an approach of competitive learning and assessment, which has been applied in many fields [8].

5 Conclusion and Future Work

In this paper, we described the design and study of a web-based peer assessment using LMS. This study has been conducted in two phases and using two inductive approaches. We emphasized the learning benefits that are associated with this type of assessment and highlighted their key limitations. Plans to take this study forward involve the development of an assessment tool that enables an anonymous, web-based peer assessment for conceptual projects. This system should also allow for the re-marking by peer if required and give the student the possibility to receive a personalized feedback as well as further clarification from reviewers. We also envisage a study of the possibilities offered by IMS QTI [6] to provide peer assessment and plan to integrate them in our future assessment processes.

References:

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