PERCEPTION OF PEER ASSESSMENT BY CIVIL ENGINEERING STUDENTS

Natascha van Hattum-Janssen\textsuperscript{1}, Rosa M. Vasconcelos\textsuperscript{2},

Abstract — One of the research projects of the Council of Engineering Courses of the University of Minho (Portugal) is aimed at improving student learning through involvement in the assessment process. The first year students of the Civil Engineering course participated in three subjects that required an extensive and growing responsibility in their own assessment of learning. Students assessed and graded each other at three different assessment tasks, using student-defined criteria and they completed a questionnaire on their perceptions of peer-assessment, their self-confidence, their ability to assess and to grade their peers. They compared traditional assessment with peer assessment. The results of the closed questions indicate on the one hand an ability and self-confidence with regard to assessing their peers, the open comments on the other hand show a certain discomfort with the concept of peer assessment. The article explores the perception of students of the assessment process.

Index Terms — Engineering education, peer assessment, perception.

INTRODUCTION

Assessment in higher education is becoming more important as a tool to improve learning. Although teaching and the curriculum are part of the learning context as well, assessment determines to a great extent the way students learn [1]. A deep learning approach can be regarded as deep or superficial. A deep learning approach is aimed at understanding, relating different ideas, trying to identify patterns, verifying conclusions and showing a critical attitude. A superficial learning approach is related to memorising, lack of reflection and a lack of integration of different concepts [3]-[4]. Assessment of learning affects the approach to learning and could be used as an instrument to change it to a more profound one [5]-[7].

Currently, assessment in higher education is no longer taking place just at the end of the subject, but is becoming an integrated part of it. A change also argued by Holroyd [8]. He identifies the following dimensions of change in assessment: (i) increasing emphasis on the learning enhancement purpose of assessment rather than its certification and accountability purposes; (ii) increased attention for formative rather than summative aspects; (iii) more emphasis on a standards model of assessment, involving criterion-referenced assessment, and less on a measurement model, involving norm-referenced assessment; (iv) more frequent provision of descriptive comment and constructive feedback and less restriction of assessor response to marks, grades and summary labels; (v) a move from dependence on one main method of assessment (and end-of-course assessment) to deploying a variety of methods (and within-course assessment); (vi) less reliance on assessment by teaching staff alone and more involvement of self, peers and workplace assessors; (vii) increased insistence on assessment as integral to teaching rather than a separate activity occurring after teaching” [8, p. 29]. These changes are clearly reflected in today’s engineering education. Assessment is changing from a teacher-centred end-of-course activity to a student-centred integrated part of the curriculum. The change of paradigm from teacher-centred education to student-centred learning does directly affect the role of the teacher, who is no longer the centre of the teaching and learning process, but acts as a facilitator of learning to students who not only acquire technical competences, but also focus on competencies that prepare them for lifelong learning in a knowledge society. Apart from this changing role of teachers, assessment is transforming as well.

More involvement of students in general means more involvement of students in assessment as well, in order to guarantee that is coherent with learning. Taking part in the assessment process is a way to increase students’ responsibility [9]. Through an active participation in the assessment process, students develop skills on critical reflection, communication and management [10]. Peer assessment is considered one of the methods that require a larger involvement of students. Taking part in peer assessment requires a critical attitude and a more structured approach to the course material. In traditional teacher-centred assessment, the teacher defines the assessment criteria, corrects the work, grades it and gives feedback. In peer assessment, students partly or entirely take over these responsibilities. Students no longer depend completely on their teachers for correction and feedback, but actively take part in the process and share responsibilities with each other and with their teacher. This article will present a study in which peer assessment was used as a method to increase

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students' responsibility in the assessment process, in order to deepen their learning. Peer assessment was a way to improve student learning in this study.

CONTEXT OF THE STUDY

The present study was carried out at the Civil Engineering Course of the University of Minho, in the north of Portugal. The Council of Engineering Courses involved in a series of projects aimed at enhancing profound learning through the change of assessment methods towards more student-centred assessment. As the Bologna Declaration demands more autonomous learners, prepared for lifelong learning, the Council of Engineering Courses considers the participation of students important in a process of making them more responsible for their own learning. This project includes a group of over a hundred first year Civil Engineering students and is a continuation of a project in which the ability of students to assess themselves and their peers was studied [11]. This study showed that students were able to actively take part in the assessment process, but also revealed some difficulties with the concept of peer assessment. In order to identify students’ problems with peer assessment, a study was carried out to identify their perceptions and to analyse the factors that determine their self-confidence in evaluating, grading and giving feedback to their peers.

METHOD

In total 98 students responded to a questionnaire that was handed to the first year students. Of them, 24 were female and 74 were male students, all of them participating in the subject first year subject of Geology for Civil Engineering. The assessment consisted in three different tasks with a divided responsibility for teachers and students. The first assessment task was the analysis of a geological map using specific software, resulting in a report. The second task was related to a study visit to the Venda Nova dam. Different groups had to work on different themes leading to an oral presentation by all members of the group and accompanied by a small report. The third assessment task was an individual test. The assessment and grading of each assessment tasks was performed by peer groups using a correction form, as well as by the teachers.

A questionnaire was developed to evaluate the perception of the students with regard to the peer assessment process. Apart from 42 closed items on 6 scales, 3 open questions were included. The first scale concerns the definition of assessment criteria by the students. The second evaluates the quality of the criteria. The classification dimension consists of three subscales that evaluate the correction of the work of peers, the classification and the perception of the adequacy of the grade. The justification and recommendation dimensions refer to the difficulty of stating justification and recommendation for the peer groups, as required after having given a grade. The comparison dimension is about this subject in comparison with the other subjects of the semester that work with more traditional assessment methods. The penultimate dimension refers to the communication within the student group and to the individual performance, whereas the last one is about the availability of computers and working space to meet and work.

RESULTS

A principal components factor analysis of the responses identified three distinct factors with eigenvalues greater than 1, accounting for 39.6% of the variance.

Five scales have a high factor loading on factor 1: one is on the evaluation of the work of the peer group, one refers to the grades that are assigned, two refer to processes that take place after the assignment of grades and the last one is group communication.

<table>
<thead>
<tr>
<th>Subscres</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
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<tbody>
<tr>
<td>Definition of criteria</td>
<td>781</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of criteria</td>
<td>878</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correction of peer work</td>
<td>731</td>
<td></td>
<td></td>
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<tr>
<td>Complexity of grades</td>
<td>840</td>
<td></td>
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<tr>
<td>Adequacy of grades</td>
<td>521</td>
<td></td>
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<tr>
<td>Justifications</td>
<td>649</td>
<td></td>
<td></td>
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<tr>
<td>Recommendation</td>
<td>736</td>
<td></td>
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<tr>
<td>Comparison with traditional system</td>
<td>803</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group performance</td>
<td>877</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>652</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>3.82</td>
<td>1.49</td>
<td>1.16</td>
</tr>
<tr>
<td>% of explained variance</td>
<td>27.28%</td>
<td>16.97%</td>
<td>13.34%</td>
</tr>
</tbody>
</table>

This factor reflects group functioning in peer assessment. The perception of the correction of peer group work, the assignment of grades and the deliberation process students go through and the processes of writing justifications and recommendations are related to the communication that takes place during and after lessons in which assessment happens.

The second factor has high factor loadings on three subscales, of which the first one reflects the perception of the assigned grade by the students. To what extent do they consider the grade fair. The second scale with a high factor loading compares the peer assessment method with the assessment method of other subjects of the same semester and the third one is on the individual performance in the group work. This factor relates the self-confidence of students to their individual effort.

<table>
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<tr>
<th>Subscres</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
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<td>Definition of criteria</td>
<td>95</td>
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<td>20</td>
<td>6.32</td>
<td>4.878</td>
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<tr>
<td>Use of criteria</td>
<td>94</td>
<td>-20</td>
<td>20</td>
<td>8.03</td>
<td>6.428</td>
</tr>
</tbody>
</table>
The third factor groups two scales on the definition of criteria for assessment, as suggested by the students. Table 3 shows the results of the questionnaire for each one of the scales. All of these scales have a positive mean. One of the students feels difficulties in grading their colleagues. They find it neither easy nor difficult to grade. More than 75% of the students are convinced that the assign grades is similar to the one assigned by the teacher. In general, they consider the grades correct and fair. Their personal effort is regarded as large. Writing recommendations and justification was not seen as difficult.

The answers to the three open questions indicate that students like the group work that was involved in the assessment moments. Nearly 30% of the students referred to group work as a positive aspect of the peer assessment moments. Secondly, they enjoyed the themes they had to work on. Especially the second assessment moment was mentioned as interesting. Around 10% of the students stated the correction of peers as a positive aspect; the fact that the teacher was not the only person responsible for assessment. Some students had the opinion they were obtaining better grades because of peer assessment and 7.4% referred to understanding of the assessment process as a positive feature of peer assessment. With regard to the negative aspects of the peer assessment process, 20.2% of the students mentioned a dislike of assessing peers in general, without explaining a specific reason. Nearly 10% of the students responded they were not convinced peer assessment was fair. They were not sure they could assess their peers properly. About 6% of the students did not agree with the fact that the groups were formed by the teachers, instead of the students and 5% complained about deadlines that were too tight.

Students were also asked to suggest improvements of the peer assessment as was applied in their subject. Giving students the freedom to choose their own group members was suggested by 67% of the students. The other comments were all made by small numbers of students. Some suggested providing more information on the assessment process, whereas others argued that the teacher should be more involved.

**DISCUSSION**

The perception of the students of the peer assessment process is in the first place determined by the cooperation in the group. The communication within the group while correcting work and writing justifications and recommendations influenced the perception of the peer assessment process. The results could indicate that a better communication in the group facilitates the correction of the work of peer groups.

The individual performance on the other hand is related to the self-confidence of the student about his capacity of correction and assignment of grades. The results indicate that a better individual performance is related to a more positive perception of the assessment method.

The process of defining assessment criteria is the third component of the perception of students. This process takes place before the group work starts and can therefore not be influenced by individual performance or group communication. The results of the questionnaire show a general positive attitude, especially compared with subjects with a traditional assessment with a limited role for the student. Students affirm they learn more, feel more responsible and more motivated for learning. Although they have difficulties assessing their peers, they feel confident to assess the work of their peers. The results confirm the usefulness of the assessment process as a tool to improve learning as also mentioned by Williams [12], who found a general positive attitude towards peer assessment and identified three specific advantages: (i) being able to compare different approaches to an assessment task, (ii) being able to compare standard of work; (iii) exchange of information and ideas. The way the peer assessment is organised in this project provided a number of different learning opportunities, starting with the definition of criteria and being reinforced while assessing and providing feedback to the peer groups.

Although the closed answer questions suggest a general positive perception towards peer assessment, the open answer questions do not confirm this perception. Specific features of peer assessment were not mentioned frequently when asked for positive aspects and on the other hand, students mentioned that fact that they had to assess their peers most frequently as a negative aspect. In interviews held with a sample of the students, they explained that they did not feel at ease assessing their peers, especially at the beginning of the semester. They are first year students with no experience in of peer assessment, which can influence their perception accord. This is confirmed e.g. by Hanrahan and Isaacs [13] and Wen and Tsai [14], who both identify previous experience or lack of experience as a determining influence of students’ perception of peer assessment.

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