



2nd International Conference on Higher Education Advances, HEAd'16, 21-23 June 2016,
València, Spain

Online Peer Assessment: Method and Digital Technologies

Selma Santos Rosa^{a*}, Clara Pereira Coutinho^b, Maria Assunção Flores^b

^aUniversidade Federal do Paraná, 426, Doutor João Maximiano, Jandaia do Sul, Brazil, 86900-000

^bUniversidade do Minho, Campus de Gualtar, 4710-057 Braga, Portugal

Abstract

In this research, we undertake a systematic review of literature about Online Peer Assessment (OPA) in higher education, mediated by Digital Information and Communication Technology (DICT). We identify their optional and central characteristics and we map out practices (procedures and DICT) which can be transversal, adaptable and applied in several curriculum units and education regimes. The results indicate the use of OPA as a strategy that boosts “assessment for learning”. The methods of assessment and the kinds of DICT used indicate directions for greater involvement and responsibility from the part of the student in his/her learning. Existing literature identifies the need to develop students’ skills, proving them with opportunities for self-assessment and peer assessment on a regular basis through constructive feedback. From the results obtained, OPA is seen as a cognitive tool, contributing to the building of knowledge and to reflection about learning. Issues for further reflection are also identified such as the creative development of assessment methods with a focus on diversity and innovation in order to enhance students’ learning and academic results, taking into account their learning needs in face of the expectations of current and future education and the demands of society.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of the organizing committee of HEAd'16

Keywords: online peer assessment, assessment in higher education, digital assessment.

* Corresponding author. Tel.: +55 41 3360-5000
E-mail address: selmadossantosrosa@gmail.com

1. Introduction

This article has a component linked to the assessment processes, in particular in higher education, either with regard to its functions, procedures and methods used. Traditionally, the evaluative practices in higher education include written tests or exams, with great emphasis on the classification. These tests or exams are naturally suitable in certain contexts and to achieve certain goals, but there are authors who call attention to the need for diversification and innovation of assessment practices in order to enhance learning and academic results. Empirical studies have shown that the use of alternative methods provides a more effective and motivating learning. The way in which the assessment is operationalized influences the motivation and learning of students, being seen as "a tool for learning" (Flores et al., 2014). With this point of view, there are studies that report their relevance, but highlight the connection between alternative methods of assessment and aspects related to the students' autonomy and the role of feedback, and we highlight the Online Peer Assessment (OPA) as an example.

In the literature, there are indications that OPA, as an alternative assessment method, is gaining a significant position in higher education, being one of its proposals to increase student-student, student-teacher and student-content interactions through constructive feedback, as well as involve the student in the process of assessing their own learning. Reported in a wide range of knowledge areas, OPA has been encouraged by assuring anonymity of authorship more efficiently by allowing students to express freely their ideas about the work of their peers and reduce restrictions related to time and location; by promoting a more honest and fair assessment; for helping to resolve issues related to the workload of teachers and classes with large numbers of students; and allowing to save time with classification (Issa, 2012; Bouchoucha & Wozniak, 2010; Dominguez et al., 2012).

As discussed above, in this article we have intend to make a contribution to the state of the art. We present results of a Systematic Review of the Literature (SRL), which aimed to identify the Digital Information and Communication Technologies (DICT) and the assessment methods used in OPA strategies in higher education. For this, we question: What are the Digital information and Communication Technologies (DICT) used in OPA practices in higher education? How does the training of peers occur? What are the assessment methods used in the OPA?

2. Methodology

The present research consists in the realization of a SRL, as shown below:

2.1 Protocol for the Systematic Review of the Literature

For the purposes of the SRL, we have included articles available in the databases SCOPUS, ISI Web of Science and ACM Digital Library. For the search, we have defined the following keywords: "Peer assessment" and "Higher Education" and, from the results obtained, we read of the articles found ($n = 118$, from which: SCOPUS = 37, Web of Science = 54 and ACM = 27), with the porpuse of identifying those relating to ICT. The search was conducted between the months of January and March 2015 and included researches between 2005 and 2015.

2.2 Criteria for inclusion and exclusion

From this first survey ($n=118$), presented in the previous sub-section, we have performed an initial review of the adequacy of the articles related with DICT and, as a result, we have pre-selected 35 articles, 23 were excluded and remained a total of 12 articles. The main reasons for the exclusions were: articles with different titles, but with the presentation of the same experience with OPA; with a focus on basic education; the same article in two different databases; assessment of the results of OPA, but not described; describing what DICT were used for, but not describing the procedures of OPA; and with insufficient descriptions for the understanding of the procedures of OPA.

2.3 Characterization of the Documentary Corpus

In table 1 we present the documentary corpus of this research:

Table 1 - Selected articles related to OPA in higher education.

Author(s)	Year	Title
1.Issa	2012	Promoting learning skills through teamwork assessment and self/peer evaluation in higher education
2.Wen & Tsai	2006	University Students' Perceptions of and Attitudes Toward (Online) PA.
3. Bouchoucha & Wozniak	2010	Is PA of asynchronous group discussions fostering skills relevant to our future graduates? Bouchoucha e Wozniak.
4. Eugenia	2014	Using a mixed research method to evaluate the effectiveness of formative assessment in supporting student teachers' wiki authoring. Eugenia
5. Grez & Valcke	2013	Student Response System and How to Make Engineering Students Learn Oral Presentation Skills
6.Wing-Shui	2012	The Impact of PA and Feedback Strategy in Learning Computer Programming in Higher Education
7. AL-Smadi, M.; Guetl & Kappe	2009	PASS: Peer-ASSESSment Approach for Modern Learning Settings
8. Berns, Palomo-Duarte, Doderó & Cejas	2012	Guess it! Using gamified apps to support students foreign language learning by organic community-driven peer-assessment
9. Chang, Chen, Kuo & Shen	2011	A Simulation-Based LED Design Project in Photonics Instruction Based on Industry–University Collaboration.
10. Chen, Wei, Wua & Uden	2009	Effects of high level prompts and PA on online learners' reflection levels.
11. Dominguez et al.	2012	Online PA: an exploratory case study in a higher education civil engineering course
12. Levin-Peled, Kali & Dori	2007	Promoting collaborative learning in higher education: Design principles for hybrid courses

2.4 Categories of analysis

The definition of categories of analysis resulted from a review of the literature on peer assessment in higher education. As a result, we have defined three categories: (1) Organization and distribution of peers; (2) method of assessment (quantitative, qualitative or mixed) and; (3) DICT.

3. Presentation of the Results

In this section we present the results achieved through the SRL.

3.1 Category 1: Peer-to-peer Organization and Distribution

In the articles analysed, the number of participating students of each OPA was 27 to 312 ($n = 27, 69, 76, 93, 95, 157, 163, 267, 312$). The Organization of peers (student-evaluated and student-evaluator) occurred in different ways: in groups of 2 to 6 students-evaluators; in pairs, changing roles between student-evaluated and student-evaluator; and where the student-evaluated received assessment of all students in the class. There were 4 articles in which there was no information about the forms of peer organization.

The peer group organization leads the integration of assessment with cooperative work, in order to enable the development of communication skills, leadership, time management, problem solving, decision making and increase the responsibility of the student from the results that must be generated by his/her group. In addition, due to its

dynamics, the group organization can provide more interesting learning experiences from the student's point of view and more effective from the teacher's point of view, as well as generate new ideas from different perspectives, which leads to more instances of constructive discussions and debates.

Regarding the distribution of students, three articles mentioned and presented different strategies: the student chooses his/her pair (Issa, 2012); randomly into groups defined by themes/directives (Bouchoucha & Wozniak, 2010); and in groups with heterogeneous members according to their grades obtained in previous reviews (Chen et al., 2009).

In cases in which there are classes with a large number of students (more than 30) the formation of groups (3 or more students), reduces the amount of final work to be assessed by the teacher and give better conditions for him to evaluate and develop feedback for each group with more quality. An alternative to similar situations is to consider that the peer review is the performance indicator of the pair-evaluated and the teacher just a mediator during the development of the OPA process. In this case, important to invest in the preparation of the student about how to assess, considering ethical factors of responsibility, of criticality, among others. In classes with a small number of students (under 30), becomes favourable to develop OPA in which the teacher assessment is adopted as the only method of learning performance indicator, or consider an alternative such as the joint proposal by Eugenia (2014), in which OPA represented 50% of the final grade assigned to the student, added to the other 50% of the teacher's grade.

Therefore, we consider that both the organization and the distribution of peers are fundamental factors in the design of OPA, and this choice should be related to the learning objectives and with the established contexts.

3.2 Category 2: OPA Assessment Method

The most common assessment method in the 12 articles analysed was the quantitative classification (n=7), second, the qualitative rating (n=4) and, third, the mixed review (n=1).

a) Proposals with quantitative assessment method:

In the proposal of Bouchoucha & Wozniak (2010), the assessment was composed by messages posted in the discussion forums in 0 to 5 points scales with star ratings into a virtual learning environment tool called Blackboard, based on 4 criteria: originality, argument, type of interactions and demonstration of critical thinking skills. The scores were assigned by peers-evaluators. Grez & Valcke (2013) used items based on 9 criteria (three content-related criteria, five criteria related to the delivery and one general criterion). Students-evaluators assigned 0 to 5 ratings points to students-evaluated. In the end, the student-evaluated was required to prepare a short report on his/her assessments. On the other hand, Eugenia (2014) used assessment items developed by the teacher for the use of students, related with the content, design, organization and credibility.

Chang et al. (2012) combined two types of evaluators: a content specialist and peers-evaluators (students), both assigning scores on a scale of 1 to 6 points for each activity item. In the proposal of Dominguez & Gonçalo Cruz (2012), the peer-evaluator assigned grades to the work of the peer-evaluated on a scale of 0 and 1. Then the teacher assessed using the same scale, both peer-evaluator and the peer-evaluated work and assign a score to both. A second score was assigned by the teacher to the peer-evaluated after adjustments in their work according to the peer-evaluator and teacher considerations. The final score of this activity was obtained from the average of the two scores assigned to the peer-evaluated by the teacher.

AL-Smadi, Guetl & Kappe (2009) proposed a method in which for each response by student-evaluated, the student-evaluator was responsible for assigning marks with special identifiers: highlight the answer (means you're wrong), highlight some parts of the answer (means you are correct) or change to italic (meaning they are irrelevant). A score with the indications of "0" (very bad) to "10" (very good) was also assigned by the student-evaluator to the peer-evaluated. Finally, in Berns et al. (2012), the work of the student-evaluated receive scores (numeric) from other students, to serve as indicators of their quality.

b) Proposals with qualitative assessment method:

CHEN et al. (2009), Wing-Shui (2012) and Issa (2012) opted for a method of peer assessment conducted with a collaborative component (oral and written feedback), without attribution of scores. On the other hand, Levin-Peled,

Kali & Dori (2007) used different methods in 3 courses: (1) the students have developed criteria and participated in peer review, with written feedback; (2) students evaluate the performance of their peers as a short course instructors sending written feedback and; (3) students were involved in the development of assessment criteria and their application in the course, and then each student was subjected to a multidimensional assessment based on their contribution to the discussion in the online forum, both as a leader and as a participant presenting a summary in the classroom, including a comparison with other two articles and a final project.

c) Proposals with mixed assessment method: qualitative and quantitative:

In the proposal of Wen & Tsai (2006), at every stage of OPA, the students' works were assessed qualitatively by their peers through written feedback and quantitatively by the teacher with 1 to 7 ratings, considering three headings: viability, creativity and knowledge. Using the same directives provided by the teacher, with the aim of conducting a reliability test, an experienced specialist in this field of knowledge evaluated a sample consisting of 20 of the 163 participating students.

3.3 Category 3 Digital Information and Communication Technologies

In the development of OPA of the reviewed articles, the following DICT were used: A constructivist virtual learning environment and with one reference to Blackboard; Google Docs; Wiki; discussion forums; Microsoft Office documents; software developed specifically for OPA: the application for the Android operating system entitled "Guess It!" and a system named PASS. In addition to these resources, other have been reported, but without identification: online pages system, platform for computer programming; and the Student Response System.

The use of DICT as a cognitive tool, through which we seek to develop OPA, is placed in two levels: on the one hand, the existing DICT are explored and developed for diverse purposes (Google docs, Wiki, text editors, virtual learning environments, the Student Response System); on the other hand, with the increase of the researches and practices of OPA, tools have been developed to meet specific needs as for example, the "PASS" proposed by Al-Smadi, Guetl & Kappe (2009), designed to provide an environment that allows the student-evaluator to select specific parts of the answers from their peers and mark them by means of combinations of keys used as special identifiers: highlight the answer (means you're wrong), highlight some parts of the answer (means you are correct) or change to italic (meaning they are irrelevant); and the "Guess it!" proposed by Berns et al. (2012), whose purpose is to explore the collective intelligence in the language learning using mobile communication devices. Therefore, such as the "Guess it!" other mobile applications for OPA have been investigated in the context of media innovation support for formative assessment, to allow students to reflect on their own learning using images or audio and video files, exchanging messages between peers and allowing greater flexibility of time and space.

From the findings in the OPA practices analysed, we consider that DICT can help teachers build assessment strategies, make valid judgements of progress of student learning, facilitate the exchange of feedback and support collaborative learning. Some of the assessment principles proposed with the use of DICT can be used to contribute to a balance between the assessment as an instrument for measuring student achievement (learning assessment) and evolve to an assessment that involves students actively in the processes of assessment of their own learning (assessment for learning).

4. Final Considerations

The assessment methods and the types of DICT used in the articles reviewed, indicate that OPA strategies can promote greater involvement and responsibility of students in their own learning. As a result, essential skills are developed for their professional life, where they will have to constantly set goals and evaluate their own objectives, their strategies and their decisions. The SRL in the field of OPA revealed a concern with organizational and structural aspects. Our considerations are that such strategies, as cognitive tools, are contributes to the construction of knowledge. A challenge is in its creative development with a focus on diversification and innovation of assessment practices in order to enhance learning and academic results, according to the learning needs facing the expectations of current and future education and the use of ICT by society.

References

- Al-Smadi, M.; Guetl, C.; Kappe, F.(2009). Pass: Peer-ASSESSment Approach for Modern Learning Settings. M. Spaniol et al. (Eds.): ICWL 2009, LNCS 5686, 44–47.
- Berns, A.; Palomo-Duarte, M.; Doderó, J.M.; Cejas, A. (2012). Guess it! Using gamified apps to support students foreign language learning by organic community-driven peer-assessment. Facultad de Filosofía y Letras. Escuela Superior de Ingeniería. University of Cadiz, Spain.
- Bouchoucha, S.; Wozniak, H.(2010). Is PA of asynchronous group discussions fostering skills relevant to our future graduates? Proceedings ascilite Sydney.
- Chang, S-H.; Chen, M-L.; Kuo, Y-K.; Shen, Y-C. (2011). A Simulation-Based LED Design Project in Photonics Instruction Based on Industry–University Collaboration. *IEEE Transactions on Education*, Vol. 54, no. 4.
- Chen, N-S.; Wei, C-W.; Wua, W-T.; Uden, L. (2009). Effects of high-level prompts and PA on online learners' reflection levels. *Computers & Education* 52, 283–291.
- Dominguez, C.; Gonçalo Cruz, A.M. Pedrosa, D., Grams, G. (2012). Online PA: an exploratory case study in a higher education civil engineering course. *IEEE*.
- Eugenia M.W. Ng. (2014). Using a mixed research method to evaluate the effectiveness of formative assessment. *Computer and Education*. Volume: 73 Pages: 141-148.
- Flores, M. A.; Veiga Simão, A. M.; Barros, A., & Pereira, D. (2014). Perceptions of effectiveness, fairness and feedback of assessment methods: a study in higher education, *Studies in Higher Education*. Grez, L.; Valcke, M. (2013). Student Response System and How to Make Engineering - Students Learn Oral Presentation Skill. *International Journal of Engineering Education* Vol. 29, No. 4, pp. 940–947.
- Grez, L.; Valcke, M. (2013). Student Response System and How to Make Engineering Students Learn Oral Presentation Skills. *International Journal of Engineering Education* Vol. 29, No. 4, pp. 940–947.
- Issa, T. (2012). Promoting learning skills through teamwork assessment and self/peer evaluation in higher education. *IADIS International Conference on Cognition and Exploratory Learning in Digital Age. CELDA*.
- Levin-Peled, R.; Kali, Y; Dori, Y.J. (2007). Promoting collaborative learning in higher education: Design principles for hybrid courses. *CSCL'07 Proceedings of the 8th international conference on Computer supported collaborative learning*. Pages 421-430.
- Wen, M.L; Tsai, C.C. (2006). University Students' Perceptions of and Attitudes Toward (Online) PA. *Higher Education*. Volume 51, Issue 1, pp 27-44.
- Wing-Shui, NG. (2012). The Impact of Peer Assessment and Feedback Strategy in Learning Computer Programming in Higher Education. *Journal Issues in Informing Science and Information Technology*. Volume 9.