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Review

Does peer assessment in on-line learning environments work? A systematic review of the literature

Thyago Tenório [a, *], Ig Ibert Bittencourt [b], Seiji Isotani [c], Alan Pedro Silva [b]

[a] Federal University of Alagoas (UFAL), Campus Arapiraca/Pólo Penedo, Av. Beira Rio, 57200-000 Penedo, AL, Brazil
[b] Computing Institute, Federal University of Alagoas (UFAL), Campus A.C. Simões, Cidade Universitária, 57072-970 Maceió, AL, Brazil
[c] Institute of Mathematics and Computer Science, University of São Paulo (USP), Avenida Trabalhador São Carlense, 400 Centro, 13566-590 São Carlos, SP, Brazil

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ABSTRACT

There is an increase use of Peer Assessment (PA) approaches in On-line Learning Environments to support students and teachers on educational process. However, the community still lacks a comprehensive understanding of how Peer Assessment behaves within these educational environments, since there are no studies that make an analysis of the researches which has been conducted in this context, analysing the benefits and disadvantages of the use of Peer Assessment. Thus, the main goal of this work is to investigate and better understand how PA contributes in student learning as well as can bring benefits to the teachers involved. In order to meet our goal, we conducted a systematic literature review (SLR). In summary, the main findings are: (1) there are empirical evidences of the benefits of using PA in both industry and academy, and in several educational levels; (2) PA is most addressed to the correction of written activities on on-line courses; (3) About 60% of the articles showed PA improvement in student performance; (4) About 1/3 of the studies showed PA brings some benefits to teachers; (5) In some studies the use of the PA had difficulties, especially issues related to student motivation, which impairs the peer review process.

Contents

* Corresponding author.
E-mail addresses: thyago.oliveira@penedo.ufal.br (T. Tenório), ig.ibert@ic.ufal.br (I.I. Bittencourt), sisotani@icmc.usp.br (S. Isotani), alanpedro@ic.ufal.br (A.P. Silva).

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1. Introduction

The application of information and communication technologies in education has been increasingly highlighted and *leitmotiv* for the educational process. In recent years, several countries have adapted their educational approaches to promote and support the use of technology both in classroom courses and in distance learning courses. In the context of distance education - an education modality mediated by technologies on which students and teachers are separated spatially and/or temporally, or are not physically present in a classroom environment (Moran, 2008) - the use of these tools becomes extremely important to maintain a multi-way communication between the student and the teacher.

Currently there are several technologies that support this kind of education, such as intelligent tutoring systems (ITS) (Sleeman & Brown, 1982), virtual learning environments (VLE) (ex: Moodle, SOLAR, TelEduc, Blackboard, Sakai), Computer-supported collaborative learning - CSCL (Miyake, 2007) and more recently Massive Open Online Course - MOOC (Wulf, Blohm, Leimeister, & Brenner, 2014) (ex: EDX, Coursera, Udacity).

These technologies allow scalable ways to provide video conferencing content, implement social forums and monitoring student progress in these environments. However, still limited in our ability to assess and give feedback for complex work of students and often opened (written evaluations) such as mathematical proofs, design of problems and essays (Piech et al., 2013).

Faced with this difficulty, these on-line learning environments often provide simpler solutions to their users, for example, objective questions as multiple choice questions, true or false, fill gaps or to relate columns, since this kind of problem can be corrected automatically by computers. Nevertheless, in the context of more complex activities, a great burden on the teacher would be generated.

To address this problem, the community started using peer assessment techniques. Peer assessment is a process by which students or their peers attach grades or tests based on predefined criteria by the teacher (Sadler & Good, 2006). The practice is used to save teachers time and to improve student's understanding about the course materials as well as to improve their meta-cognitive skills (Malehorn, 1994), increasing their productivity.

In the context of on-line learning, the system manages the corrections made between the students, that is, the students correct the written activities of their peers. There are several approaches to peer assessment published in the literature, such as formative approaches (Orsmond, Merry, and Callaghan, 2004), probabilistic models (Piech et al., 2013) and even models using Bayesian Networks (Wang & Vassileva, 2003).

The Peer Assessment offers a promising solution that can scale the classification of complex activities in courses with dozens or even hundreds of thousands of students (Piech et al., 2013), allowing, for example, that the writings activities correction is performed without necessarily increase costs by overwork of the teachers. Its use brings many benefits to students, such as: increased responsibility and autonomy; It stimulates students to make an effort for a more advanced and deep understanding of the subject, skills and processes; It brings the student to the active role on learning; It engages students in critical thinking and It develops a better understanding of their own subjectivity and judgement (of Reading, 2014).

As a consequence, this technique results in many educational benefits, such as increased student learning, and especially the teacher's burden reduction (Sadler & Good, 2006). However, the community still lacks a comprehensive understanding of how Peer Assessment behaves within these educational environments, since there are no studies that make an analysis of the researches which has been conducted in this context, analysing the benefits and disadvantages of the use of Peer Assessment.

Hence, It is very important to investigate and better understand how Peer Assessment approaches contributes in student learning as well as it can bring benefits to teachers. It is also important to investigate whether there are real evidences of the improvements performed by Peer Assessment approaches on On-line Learning Environments. Moreover, we also need to understand: (1) On which contexts and educational levels the Peer Assessment approaches have been most investigated?; (2) What are the goals to use it?; (3) Are there evidences that indicate the use of peer assessment approaches improves the performance of students?; And (4) Are there evidences to indicate that their use helps the work of teachers?; (5) Are There difficulties in using a peer assessment approach in on-line learning environments?

Although the number of studies using Peer Assessment in On-line Learning Environments has grown considerably, there is not the existence of study that present a recent analysis about the use of this techniques applied in the context of on-line learning environment, performing an analysis of the advantages and disadvantages of its implementation.

Thus, this paper presents a Systematic Literature Review (SLR) (Keele, 2007). Our purpose is to better understand how Peer Assessment is used in On-line Learning Environments and identify in what ways it has being applied. In this way, this paper presents the results of an SLR on studies published from January 2004 to October 2014 that in short are: (1) there are empirical evidences of the benefits of using Peer Assessment approaches in both industry and academy, and in several educational levels, however the majority of studies used it from an academic point of view applied to higher education level; (2) Peer Assessment has been used with many distinct goals, but the most studies addressed the correction of written activities on on-line courses as main goal; (3) Of empirical way, it was shown that about 60% of the articles that Peer Assessment approaches improvement in student performance; (4) About 1/3 of the studies showed that to use Peer Assessment brings some benefits to teachers; (5) In some studies the use of the peer