

THE IMPACT OF ONLINE PEER ASSESSMENT ON STUDENT LEARNING IN HIGHER EDUCATION: A SYSTEMATIC REVIEW OF LITERATURE

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Abstract

In recent years, the educational processes and scenarios have slowly aimed at empowering the students with 21st century skills as well as core competencies required for career readiness [1]. This means shifting focus from a knowledge-based to a competency-based curriculum which promotes the development of skills such as autonomy, responsibility, critical thinking, and self-awareness. At the same time, with the accelerated digital transformation, technology is expected to occupy an unprecedented position in classrooms. Learning assessment practices must respond to this combination of circumstances. A new evaluation culture [2] has emerged where the student is an active participant and this is expected to produce a positive impact on students' educational outcomes and cognitive development.

Studies on alternative digital assessment [3] [4] indicate that an important contribution to the development of lifelong learning skills and sustainable assessment practices is Online Peer Assessment (OPA). "Peer assessment (also called peer review) is a collaborative learning technique based on a critical analysis by learners of a task or artefact previously undertaken by peers" (p.72) [5]. Beyond the grading procedure, the literature emphasizes the active and self-regulatory learning process enhancing student critical thinking and fostering the development of essential professional skills.

To understand the importance of OPA in higher education, a systematic review of literature was carried out considering the following research question: *In what dimensions could OPA, as an alternative digital assessment practice, impact student learning in higher education?* A literature search was conducted in the online portal B-on and SCOPUS database, restricted to the years 2017 to 2021. Only peer-reviewed studies published in English or Portuguese and with full-text access were taken into consideration.

Through a rigorous documented systematic literature review scoping process [6], studies were screened and analyzed. Findings were divided into two main categories which provide evidence on the positive impact of OPA on enhanced student learning. On the one hand, the implementation of OPA in higher education is an effective assessment technique which stimulates student performance and facilitates the acquisition of knowledge, while fostering self-awareness and critical thinking and improving metacognitive and collaborative skills. On the other hand, students are generally motivated to participate in OPA, acknowledging the several benefits presented. The creation of OPA contexts in higher education is strongly encouraged based on the results of these studies.

Keywords: systematic review, student learning, online peer assessment, higher education.

1 INTRODUCTION

In recent years, the educational processes and scenarios have slowly aimed at empowering the students with 21st century skills as well as the core competencies required for career readiness [1]. This means shifting focus from a knowledge-based to a competency-based curriculum which promotes the development of skills such as autonomy, responsibility, critical thinking, and self-awareness. At the same time, with the accelerated digital transformation, technology is expected to occupy an unprecedented position in classrooms. Learning assessment practices must respond to this combination of circumstances. A new evaluation culture [2] has emerged where the student is an active participant and this is expected to produce a positive impact on students' educational outcomes and cognitive development.

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When compared to traditional peer assessment, online peer assessment has unique advantages. It promotes participation in the review process with no constraints of time or space, while it fosters a learning environment with high levels of interactivity [8]. It easily guarantees anonymity, no printing or copying is needed, and it allows "instant electronic submission, storage, distribution and retrieval of student work as well as assessment data, thus enabling instructors to easily stipulate the settings for various aspects of the peer assessment process on one e-platform" (p.208) [7].

2 METHODOLOGY

To understand the importance of OPA in higher education, a Systematic Review of Literature (SRL) was carried out. According to [9] "Systematic reviews are a form of research; they are (...) a way of bringing together what is known from the research literature using explicit and accountable methods" (p.1) [9].

The following research question was the point of departure of this systematic review of literature: *In what dimensions could OPA, as an alternative digital assessment practice, impact student learning in higher education?*

2.1 Data sources and search strategies

This SRL was carried out on SCOPUS database and on the portal B-on, a portal that gives access to lots of international scientific journals and books, which is the result of a consortium of universities and other research institutions from Portugal. After performing scoping searches, identifying the review question and writing the protocol [6] the search terms were restricted to appear in the paper title on the portal B-on and on the title, abstract or keywords on the Scopus database, and were combined with Boolean operators. The following terms were used as the final search string: TI ("web-based peer assessment" OR "online peer assessment" OR "technology-facilitated peer assessment" OR "peer e-assessment") OR TI ("peer assessment" OR "peer evaluation" OR "peer feedback" OR "peer assessment accuracy" OR "learning-oriented peer assessment") AND TI ("learning outcome" OR "learning achievement" OR "lifelong learning" OR "outcome-based learning") AND TI ("performance-based assessment" OR "assessment of learning" OR "edumetric assessment" OR "alternative assessment" OR "sustainable assessment" OR "authentic assessment") AND TI "higher education". The search was limited to the years 2017 to 2021 and only peer-reviewed studies published in English or Portuguese, with access to full texts, were taken into consideration. This first search resulted in 96 studies from B-on and 17 from Scopus. After removing duplicates and screening titles and abstracts, a total of 27 texts were selected for further analysis (B-on=21 and SCOPUS=6).

2.2 Constitution of the corpus of analysis

These 27 results were thoroughly read and examined and the articles which did not meet the following inclusion criteria were eliminated:

- The participants in the study must belong to the higher education context;
- The study must focus on peer assessment mediated by technology;
- The study should focus on student perceptions and learning outcomes when involved in the OPA process;
- Only primary studies were considered.

Table 1 presents the 15 studies included in this systematic review.

Table 1. Constitution of the corpus of analysis

<i>Authors</i>	<i>Title of the study</i>
Lin (2019) [10]	An online peer assessment approach to supporting mind-mapping flipped learning activities for college English writing courses.
Kumar et al. (2019) [11]	Anonymous online peer assessment in an undergraduate course: An analysis of Students' perceptions and attitudes in the South Pacific.
Ibarra-Saiz et al. (2020) [12]	Developing student competence through peer assessment: the role of feedback, self-regulation and evaluative judgement.
Kobayashi (2020) [13]	Does anonymity matter? Examining quality of online peer assessment and students' attitudes.
Wang et al. (2020) [14]	Factors associated with students' attitude change in online peer assessment – a mixed methods study in a graduate-level course.
Formanek et al. (2017) [8]	Insights about large-scale online peer assessment from an analysis of an astronomy MOOC.
Zhang et al. (2021)[15]	Online peer assessment improves learners' creativity: not only learners' roles as an assessor or assessee, but also their behavioral sequence matter.
Naveh et al. (2021)[16]	Online Peer Assessment in Undergraduate Electrical Engineering Course.
Amendola; Miceli (2018)[5]	Online peer assessment to improve students' learning outcomes and soft skills.
Liu et al. (2018) [7]	Small group discussion as a key component in online assessment training for enhanced student learning in web-based peer assessment.
Cheung et al. (2019)[17]	Student Responses to Online Peer Assessment in Tertiary English Language Classrooms.
Bürgermeister et al. (2021) [18]	Supporting Peer Feedback on Learning Strategies: Effects on Self-Efficacy and Feedback Quality.
Demir (2018) [19]	Using online peer assessment in an Instructional Technology and Material Design course through social media.
Zhan (2020) [20]	What matters in design? Cultivating undergraduates' critical thinking through online peer assessment in a Confucian heritage context.
Zheng et al. (2018) [21]	Synchronous discussion between assessors and assessees in web-based peer assessment: Impact on writing performance, feedback quality, meta-cognitive awareness and self-efficacy.

3 RESULTS

Our research question aimed at finding out in what dimensions OPA, as an alternative digital assessment practice, could impact student learning in higher education. After an in-depth analysis of the focus of these studies, we considered that the results could be included into two different categories, as shown in Table 2.

Table 2. Focus of the study

<i>Focus of the study</i>	<i>Authors and Reference</i>
Effects of OPA on student learning performance.	Lin (2019) [10]; Ibarra-Saiz et al. (2020) [12]; Kobayashi (2020) [13]; Formanek et al. (2017) [8]; Zhang et al. (2021)[15]; Naveh et al. (2021) [16]; Amendola; Miceli (2018)[5]; Liu et al. (2018) [7]; Bürgermeister et al. (2021) [18]; Zhan (2020) [20]; Zheng et al. (2018) [21]
Student perceptions and attitudes towards OPA.	Lin (2019) [10]; Kumar et al. (2019) [11]; Kobayashi (2020) [13]; Wang et al. (2020) [14]; Naveh et al. (2021) [16]; Amendola; Miceli (2018) [5]; Liu et al. (2018) [7]; Cheung et al. (2019) [17]; Demir (2018) [19]; Zhan (2020) [20]; Zheng et al. (2018) [21]

3.1 Effects of OPA on Student Learning Performance

The link between learning and assessment activities has come closer over the years. Research on peer assessment has proven it to be a successful learning strategy and an assessment solution for enhancing learning efficiency as it helps students identify their strengths and weaknesses, while fostering collaborative learning [22].

Across different subject domains – English [10]; [17] [7], [21]; Astronomy [8]; Sciences [5], [21]; Finance [12], [21]; Information Technology [15]; Engineering [16]; Education [19], [18], [20], [21] –) and corresponding task types, the results of the selected studies clearly state the effects of OPA on student learning.

According to [12] learning with peers is “a key skill required for lifelong learning, which involves critical thinking and reflection and being able to evaluate one’s own work and that of others” (p.139). Therefore, both student assessors and assessees have a critical role in the learning process. When student assessors review their peers’ work and provide feedback, they are engaged in critical thinking and reflection upon both their peers’ work and their own. As assessees, receiving feedback provides awareness of weaknesses and stimulates improvement based on peers’ comments and feedback [15]. This reflection process promotes students’ understanding of the learning content, stimulates them to explore and justify their own artifacts and strengthens their critical thinking skills [10] [15] [8] [5] [20].

Promoting self-reflection has been identified as one of the benefits of peer assessment [13]. This reflective process which occurs as students evaluate peers’ work is also referred in [12] where the mediating role of participation, evaluative judgement, feedback and self-regulation in the context of peer assessment is closely related to competence development. Analyzing both their own work and that of their peers in a collaborative context, while identifying strengths and weaknesses, is a valuable element to develop student competence.

A study on the implementation of peer assessment in a massive online environment [8] concluded that, on the one hand, student participation in peer grading served as a successful predictor of completion of the course, and, on the other hand, identified learners who were more engaged in the course and had better results. Students with different starting levels might also vary in critical thinking growth when participating in OPA [20]. [5] states the considerable positive impact peer assessment has on high-achieving students, in contrast with the less impact on low and very low-achieving students. In [5] study, OPA was used in an online lab simulation due to its “potential for fostering deeper understanding of the course contents, for improving metacognitive skills, and for evaluating and promoting collaborative skills and critical thinking” (p. 73) [5]. The results showed clear and significant learning improvements.

While contrasting an online peer assessment based flipped classroom with a peer assessment flipped classroom in an English writing course, [10] reports that peer assessment could foster students’ social and collaborative skills and improve their critical thinking gradually as it helps learners become more critical, independent, and autonomous in English essay writing. Synchronous discussion between assessors and assessees in an online peer assessment context [21] also contributed to the improvement of students’ writing performance, proving that OPA can significantly improve the quality of affective and metacognitive peer feedback and students’ self-efficacy. Improvements in English writing were also registered by [7] where web-based peer assessment using the discussion of a grading rubric in a chat room considerably fostered students’ letter writing skills. With the support of rubrics, the students are empowered with diagnostic information which helps them improve feedback quality [18]. The effectiveness of OPA on students’ critical thinking development in a General Education course was studied in [20] and the results relate to the significant improvement of participants’ critical thinking as they progressed in the ability to justify their arguments with valid and consistent evidence.

A study performed by [15] enhances the improvement of creativity in students’ written artifacts due to the integration of feedback received through peer assessment. The students benefited both from the feedback they received but especially from applying the feedback they provided to their peers (i.e., self-feedback). However, the study also found that ignoring the feedback students received was proven to be worse than ignoring the feedback they provided.

The quality of feedback provided by peers is a concern for [7]. When it comes to learning gains in web-based peer assessment, the ability to distinguish between good peer feedback from inaccurate or misleading peer feedback is critical [7] as students who perceive accurate and valuable feedback are more likely to have positive attitudes towards OPA practices [14]. Providing effective online feedback, however, requires constant reinforcement and training [13] [7] [18] as students need to recognize the value of peer assessment to increase their level of engagement, confidence, and ease. Student teachers

in the study [18] also perceived higher self-efficacy after repeatedly giving and receiving peer feedback proving that both effective feedback and self-efficacy can be enhanced through training and practice.

The studies analyzed point out the main limitations of their research and the implementation of OPA didn't always have the expected results [16]. Although best practices were employed by the researcher, the study [16] concludes that the use of OPA in an Engineering class may have caused negative effects on students' perceived learning and motivation, resulting in lower average grades and a greater percentage of student failure in the course.

3.2 Student Perceptions and Attitudes towards OPA

In the studies considered for this systematic review, both quantitative and qualitative research was carried out by the authors to identify and measure students' attitudes and perceptions towards the OPA practices they were part of.

Participants in the studies [10] [11] [13] [5] [20] realised that the online peer assessment strategy enhanced their critical thinking, problem solving and improved their skills for life-long learning. General student perception was very positive [5][17][19] and student motivation, self-confidence, creativity, collaborative learning and self-reliance increased [19]. In [13] [5] [21] most students recognized the educational value of peer assessment as it improved their knowledge on the course topic.

The students enhanced the fairness and confidence of the feedback given to their peers [11] [13] [17] and learned from the process of reviewing peers' work [14]. As students received more valid and reliable feedback from other students, their attitude towards online peer assessment became positive and the feedback received was used to revise their tasks [14]. However, in [5] only 35% of the participants believed in their peers' capacity to provide qualitative feedback and half of the students in [13] confessed that they were hesitant to criticize their peers and give them low marks. Therefore, anonymity is generally preferred [13] [11] and students consider that peer assessment should not affect their overall grades too much [13].

The students also appreciated the ubiquitous learning environment which allowed them to assess others' writing and learn anywhere and anytime [10] and the students who received training considered it useful and adequate to set explicit goals and remove any misinterpretations regarding the assessment design [11] [20].

Despite the overall positive student attitudes toward OPA in the studies analyzed in this systematic review, the participants in the study [16] perceived OPA as generally not favorable, although a few students indicated a positive attitude. Students in this study found the peer assessment activity to have a less positive effect on motivation and learning.

4 CONCLUSIONS

Online peer assessment is commonly used as an alternative digital assessment practice in higher education and it has become one of the latest assessment tools in 21st century learning [11]. Results show that OPA has been widely studied in the past five years by researchers from universities all over the world who have implemented this form of assessment in different learning modes, across different subject domains, with distinct sample sizes, task types and time limits. Higher education institutions have evolved to see assessment within the curriculum as a method for learning rather than a method for measuring learning. The challenge faced is to transform students from passive receivers of knowledge to active learners and participants in learning [11], engaging in collaborative environments which facilitate knowledge acquisition and the development of teamwork skills [23].

To understand the impact of Online Peer Assessment on student learning in the higher education context, this systematic review of literature was carried out. Based on the results collected, there are two main dimensions considered in the studies presented which could directly impact student learning outcomes. On the one hand, these studies proposed the implementation of an OPA strategy to measure student learning and competence development. On the other hand, the studies also described student opinions and attitudes towards the implementation of the OPA strategy.

Findings concerning the first dimension point out that OPA is an effective assessment technique which stimulates student performance and facilitates the acquisition of knowledge. While assigning scores and writing narrative comments to peers, learners have the opportunity to apply their content knowledge, triggering their critical thinking and therefore enhancing learning. Students also reflect on their own work, recognize their strengths and weaknesses and apply their feedback to their own artifacts. Developing

self-awareness, improving metacognitive skills, promoting collaborative skills and engaging in critical thinking are lifelong learning skills obtained through OPA practices.

Results related to student attitudes and perceptions towards the implementation of online peer assessment are in line with the first dimension analyzed. Students are generally motivated to participate in OPA, acknowledging the several benefits presented above. The practice of OPA is perceived by students as an element which promotes their critical thinking, problem solving and improves their skills for life-long learning. Through judging peers' work, students realize that they enhance learning and consolidate their subject knowledge, while developing self-reflection, critical thinking and cooperative learning. Studies point out that student engagement and satisfaction with peer feedback practices improve with training and experience and that most students consider this assessment process accurate and reliable. The use of technology guarantees anonymity, offering a solution to the possible interpersonal relationship constraints mentioned by students.

According to the findings presented, the use of OPA in higher education is highly recommended and the creation of contexts in which online peer assessment can be incorporated in a pedagogical perspective is strongly encouraged. It is a valid and recognized form of alternative digital assessment which empowers the students with 21st century skills as well as core competencies required for career readiness.

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