Involvement of pre-service teachers in e-assessment activities. An empirical study on the correlation between self- and peer-assigned grades

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ABSTRACT: The involvement of students in assessment processes has been proven to enhance their learning process and their skills as evaluators. Aiming to foster this involvement, we carried out a specific training activity focused on assessment fundamentals and techniques with the students from the Pre-Primary Education Teacher Bachelor's Degree from the University of Salamanca (Spain). This activity included the production of two learning outcomes per student, both of which were graded by the author (self-assessment), two classmates (peer assessment), and a teacher (hetero-assessment) through Likert-type scales in which the participants had to express to which extent they agreed with a series of statements on the quality of the work. All the assessment activities were carried out online through a web service aimed at the construction and application of e-assessment tasks.

The data resulting from the grading activities was organized in four grades per piece of work presented: the author's self-assessment, the two scores assigned by classmates, and the teacher's mark. Through the use of a descriptive-correlational research methodology, this study aims to explore the consistency between the marks given by the different agents involved. The results indicate few significant relationships between the scores of the different agents, but they can serve as a basis for future and improved studies on the subject.

The paper also discusses the benefits of student engagement in assessment both for themselves and for teachers. These benefits include the improvement of the students' skills to make informed judgements, the promotion of their reflective abilities and critical thinking, and a greater systematization of assessment processes.

1   INTRODUCTION

The latest changes in Higher Education have led to the adoption of a competence-based approach of the teaching-learning process. This has also entailed a change in the evaluation practices, since the traditional processes were no longer fit to assess the set of skills, knowledge, and abilities (competences) acquired autonomously by the students. One of the ways to adapt the assessment processes to the new competence-based approach of Higher Education is to foster the involvement of students as evaluators, both of their own work and of their classmates' outcomes.

The consequences of student involvement in assessment activities have been researched by many authors, based on different conceptions of assessment. Authors such as Carless, Joughin & Mok (2006), Rodríguez Gómez & Ibarra Sáiz (2011, 2014) and Padilla & Gil (2008), worked under the term "learning-oriented assessment", which was related with student involvement, the proposal of authentic tasks, and the provision of feedback and feedforward. On his part, Boud (2000) referred to "sustainable assessment", which emphasised the fostering of student self-regulation through the explicitness of the assessment process. Ibarra Sáiz & Rodríguez Gómez (2016) coined the term "assessment as learning and empowerment", highlighting the appropriation of the assessment process on the part of students as a way to promote the transference of the principles of assessment to other contexts.

The incorporation of technologies to the teaching-learning process has led to the apparition of the concept of e-assessment, which can be understood as a "learning process mediated by technological resources, through which we can foster the development of useful and valuable skills for the academic present and the working future of university students as strategic professionals" (Rodríguez Gómez & Ibarra Sáiz, 2011, p. 37).

E-assessment, like regular assessment, can take different forms according to the degree of involvement of the students as evaluators. These different modalities entail the development of diverse competencies and strategies which can enrich the teaching-learning process and enhance the autonomy of the students. Below, we describe the main assessment modalities that were involved in this study.

- Self-assessment: in this modality, the student evaluates his/her own work, thus playing the roles of judge and interested party at the same time. Self-assessment enhances the student's learning process because it entails a deep understanding of the object under assessment, given that its author is acting as evaluator (Olmos Migueláñez & Rodríguez Conde, 2011). The autonomy and leading role that self-assessment bestows upon the students also provide a great opportunity for the development of their competences and skills, such as responsibility, the ability to evaluate themselves, the awareness of their own progress, successes and difficulties, and the development of critical and reflexive thinking (Olmos Migueláñez, 2008; Villa & Poblete, 2011).
- Peer assessment: In this modality, the assessment process is taken on by someone who can be considered to be at the same level as the person being assessed (Topping, 2009), such as a classmate, a colleague, etc. This modality proves to be especially useful for the assessment of the working dynamics of a group of students, since it can be quite challenging to evaluate the involvement and contributions of a particular student from outside the group.
- Co-assessment is another modality in which the student is involved, and it consists on a "process through which the teachers, along with the learners, carry out a collaborative, joint, and agreed upon analysis and evaluation of the learning actions, productions and/or outcomes" (Ibarra Sáiz & Rodríguez Gómez, 2014, p. 344). However, the involvement of the teacher in this study will take on a hetero-assessment approach, which entails a one-sided assessment process carried out entirely by the teacher, with the teacher and the student playing distinct roles (Pascual-Gómez, Lorenzo-Llamas & Monge-López, 2015). The marks given by the teacher will serve as a more objective and well-informed score against which to measure self- and peer-assessment measurements.

Considering the current relevance of e-assessment to improve the educational processes, and the importance of the students' active role within evaluation activities, we carried out an innovative experience with students from the first year of the Bachelor's degree in Pre-primary Education Teaching, in the form of a workshop imparted within the Research Project *DevalS – Development of sustainable assessment – improvement of the assessment skills of university students through virtual simulations* (EDU2012-31804) .

The workshop ran for 50 hours over the course of three months, and it was implemented with a blended learning approach through the virtual campus of the University of Salamanca. The main aim of this action was to develop the assessment skills of the students by providing them with a guided opportunity to assess both their own outcomes and those of their classmates. The activity was divided in three content sections, entitled "Starting out in assessment", "Advancing in assessment", and "Another way to assess in education". The design of this action and the teaching methodology followed the sequence proposed by Kolb and Kolb (2005), consisting in concrete experience, reflective observation, abstract conceptualization, and active experimentation.

The data analysed in this paper comes from the assessment of the learning outcomes of an activity entitled "Designing an Action Plan for My Success in University" (Rodríguez Gómez & Ibarra Sáiz, 2014), whose aim was to encourage student reflection on the strategies they utilise to achieve success in university through two SWOT analyses (Strengths, Weaknesses, Opportunities, and Threats). These analyses were focused on the students' current performance in university and the strategies they thought necessary to improve said performance. The thoughts and reflections brought on by this activity were to be materialised in an Action Plan encompassing the improvement strategies, and an Argumentative Video of each student explaining their plan. Both outcomes were assessed both by their author (self-assessment) and two classmates (peer-assessment), as well as the teacher in charge of the activity (hetero-assessment) through EvalCOMIX®, which is a web service for E-assessment.

2   METHODOLOGY

This section informs on the sample and instruments employed in this study, as well as the design of the data analysis.

2.1   Sample

Thirty students enrolled in the first year of the Bachelor's Degree in Pre-primary Education Teaching participated in the training action and subsequent study, 27 (90%) were female, and 3 (10%) were male. The teacher responsible for the training action also participated in the grading of the student outcomes.

2.2   Instrument

The data collection phase of the study was conducted through two six-point Likert-type scales ranging from "strongly disagree" to "strongly agree". These instruments asked the assessor to convey their degree of agreement with different statements on the quality of the learning outcome under assessment.

The instrument for the Action Plan consisted of 11 items divided in five criteria or factors: adequacy, feasibility, realism, appropriateness, and coherence. Figure 1 shows the wording of the items, their division in the different factors, and the weight of each factor in the final grade.

	Assessment scale for the Action Plan "My success at university"						
20%	Adequacy	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	strongly agree
100%							
33%	01. The Action Plan is adjusted to the formal presentation rules (format, length, references, APA style, etc.)	○	○	○	○	○	○
33%	02. The Action Plan develops all its elements in an orderly and logical way.	○	○	○	○	○	○
33%	03. The language used indicates a correct command of the technical terminology on assessment.	○	○	○	○	○	○
20%	Feasibility	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	04. The actions specified in the Action Plan are feasible for the student.	○	○	○	○	○	○
50%	05. The temporal organization of the Action Plan is credible and adjusted to the characteristics of each activity (i.e. it can be accomplished).	○	○	○	○	○	○
20%	Realism	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	06. The activities in the Action Plan are sensible and precise, that is to say that they are presented as they are (they do not seem to be exaggerated or understated).	○	○	○	○	○	○
50%	07. The responsibility of the completion of the action lies fundamentally on the student.	○	○	○	○	○	○
20%	Appropriateness	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%	Subdimension1						
50%	08. The Action Plan is coherent with the strengths, weaknesses, opportunities, and threats detected.	○	○	○	○	○	○
50%	09. The actions reflected in the Action Plan are necessary and useful for its completion.	○	○	○	○	○	○
20%	Coherence	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	10. The arguments provided are base don evidences (relevant data or opinions).	○	○	○	○	○	○
50%	11. The synthesis of actions presented in the Plan (at the beginning or at the end) is logical, clear, and convincing.	○	○	○	○	○	○

Fig. 1. Instrument for the assessment of the Action Plan "My success in university" Source: Rodríguez Gómez & Ibarra Sáiz (2014)

The instrument for the assessment of the Argumentative Video (figure 2) was composed of 9 items divided in the following factors: adequacy, originality, clarity, sufficiency, appropriateness, and enjoyment.

Assessment scale for the Argumentative Video "My success at university"							
16%	**Adequacy**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	01. The Argumentative Video is adjusted to the formal presentation rules (format, length, etc.)	○	○	○	○	○	○
50%	02. The video reflects the essential elements of the Action Plan.	○	○	○	○	○	○
16%	**Originality**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
100%	03. The presentation of the contents is done in a creative way.	○	○	○	○	○	○
16%	**Clarity**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	04. The student's knowledge is presented with simplicity and accuracy.	○	○	○	○	○	○
50%	05. The video allows us to follow the thematic thread of the information presented.	○	○	○	○	○	○
16%	**Sufficiency**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
100%	06. The Argumentative Video provides the necessary information to globally understand the Action Plan.	○	○	○	○	○	○
16%	**Appropriateness**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
50%	07. The contents presented are adjusted to the features of the resource employed.	○	○	○	○	○	○
50%	08. The contents of the video are relevant and useful.	○	○	○	○	○	○
16%	**Enjoyment**	Strongly disagree	Disagree	Slightly disagree	Slighty agree	Agree	Strongly agree
100%							
100%	09. The video is attractive and it fosters interest and facilitates the following of its thread.	○	○	○	○	○	○

Fig. 2. Instrument for the assessment of the Argumentative Video "My success in university" Source: Rodríguez Gómez & Ibarra Sáiz (2014).

2.3 Design

This paper presents a descriptive-correlational study involving different agents in the role of assessors of student learning outcomes. The first agent involved is the author of the outcomes under assessment, namely the student (ST), who performs a self-assessment task. The peer-assessment part of the study is carried out by two classmates (C1 and C2), whose mean score (Cμ) will be obtained for the sake of easier comparison. The last agent involved is the teacher (T), whose experience as an evaluator and familiarity with the assessment process and criteria can provide a more objective score to compare the work of the two pervious agents.

The scores assigned by all these agents will be paired up in order to analyse the degree of coherence between them.

3 RESULTS

This section presents the results of a correlational study using the assessment scores assigned both by the students and the teacher. Aiming to discern which methodology would be more suitable to analyse the data at hand, we conducted a Kolmogorov-Smirnov normality test, which resulted in a significance level of .000, thus leading to the selection of non-parametric statistic techniques (Spearman's correlation coefficient) on account of the lack of normality of the sample. Given that our hypothesis is that the relationship between the scores of the different agents involved will be positive, the correlations are of a unidirectional nature.

In the first place, we analysed the general correlation coefficients for the scores assigned by the student (ST), the classmates (C1 and C2, with Cμ being the average), and the teacher (T) for both student outcomes: The Action Plan (AP) and the Argumentative Video (AV).

	Correlation coefficient	Sig. (1-tailed)
AP C_1-C_2	.275	.001
AP ST-C_μ	.366	.000
AP ST-T	.272	.000
AP C_μ-T	.338	.000
AV C_1-C_2	.665	.000
AV ST-C_μ	.524	.000
AV ST-T	.627	.000
AV C_μ-T	.504	.000

Table 1. General correlation coefficients

Table 1 shows that all general correlation coefficients are significant at the .01 level. However, it is worth noting that the coefficients for the Argumentative Video are notably higher than those of the Action Plan.

We also analysed the data according to the different criteria in which the instruments were divided. The assessment instrument for the Action Plan was divided in five criteria or factors, each one consisting of several items: adequacy, feasibility, realism, appropriateness, and coherence. As table 3 shows, there are few significant correlations between the grades assigned by the agents, and interestingly, one of the few that is significant (s.l. .05) indicates a negative relationship between the marks of the two classmates in the items related to the coherence of the Action Plan. In fact, more than half of the factors for this pairing (C1-C2) have a negative relationship, be it significant or not.

Factor	C_1-C_2	Sig.	ST-C_μ	Sig.	ST-T	Sig.	C_μ-T	Sig.
Adequacy	.274	.075	.166	.115	-.032	.413	.117	.187
Feasibility	.223	.172	.157	.183	.116	.260	.248	.061
Realism	-.238	.157	.055	.378	.146	.208	-0.64	.349
Appropriateness	-.118	.311	.454	.003	.190	.141	.052	.367
Coherence	-.418	.017	-.229	.090	-.264	.066	2.24	.082

Table 2. Correlation coefficients and significance by factor, Action Plan.

In its turn, the items from the instrument used to assess the Argumentative Video were grouped in six factors: adequacy, originality, clarity, sufficiency, appropriateness, and enjoyment. The analysis of this instrument yielded overall higher correlation coefficients, and also more significant ones. The highest correlations and the greater number of significant relationships occur between the scores of the classmates (pairing C1-C2) and between the scores of the student and the teacher (pairing ST-T).

Factor	C_1-C_2	Sig.	ST-C_μ	Sig.	ST-T	Sig.	C_μ-T	Sig.
Adequacy	.880	.000	.307	.056	.226	.107	.171	.153
Originality	.229	.355	.525	.027	.410	.057	.341	.077
Clarity	.142	.347	-.025	.450	.486	.003	-.063	.355
Sufficiency	.412	.245	.000	.500	.369	.080	-.064	.397
Appropriateness	.633	.025	.000	.499	.359	.022	.020	.452
Enjoyment	.368	.271	.298	.150	.146	.294	-.052	.472

Table 3. Correlation coefficients and significance by factor, Argumentative Video.

4   DISCUSSION

The benefits of the involvement of students in assessment activities has been agreed upon by many authors (Olmos-Migueláñez, 2008; Villa & Poblete, 2011; Andrade and Valtcheva, 2009; Padilla and Gil, 2008; Ladyshewsky, 2013). These benefits apply both to the teachers and the students. Some of the advantages of this assessment approach for the teacher are a better structuring of the teaching-

learning process around the assessment criteria that must be specified from the beginning of the course, the sharing of some of the assessment duties that traditionally fall solely on the teacher, or the predomination of formative assessment over summative assessment, and the benefits for the students include the enhancement of their skills to make informed judgements or solve problems, the promotion of their critical thinking and reflective thought abilities, or a greater systematisation of the assessment process (Olmos-Migueláñez, Torrecilla-Sánchez & Gamazo, In Press).

This study yielded fewer significant results than another one conducted with a like-minded sample (third-year students from the Bachelor's Degree in Primary Education Teaching) and the same instruments and training action (Olmos-Migueláñez, Torrecilla-Sánchez & Gamazo, In Press). This difference in signification could be due to many factors, such as the size of the samples, or the fact that the students participating in this study were starting their degree and the participants from the other study had had three whole years of training in a degree which is highly related to assessment topics. Either way, this question begs further study into the factors that influence the development of student self and peer assessment skills, so that we can use the findings to enhance these skills through regular university training, and not only specialised courses.

The main limitation of this study is the small sample size. Since the data collection was preceded by a voluntary training action spanning several months, there were few students willing to commit to the seminar from beginning to end, hence the low number of participants. This shortcoming greatly hinders any possible generalisation of the results found.

An interesting future line of research would be to integrate this methodology in compulsory university courses or subjects with a double objective: to incorporate student involvement in assessment as an integral part of the subject, and to gather data to conduct future research leading to an overall improvement of the teaching-learning process in higher education.

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