

# DEVELOPMENT OF AN "AUGMENTED E-RUBRIC" WITH CRITICAL THINKING TO ASSESS COMPETENCES

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## Abstract

The European Higher Education Area (EHEA) promotes competence-based assessment using varied, diverse and innovative assessment tools. In this sense, the accreditation of the Agricultural Engineering Degrees and Masters at the University of Valladolid recommended to insist in the assessment based on the competences that students must acquire. In doing so, in previous teaching innovation projects, we developed rubrics to align the assessment with the competences that students must acquire, and we have assessed subject's practices that allowed students to contact with companies and strengthen the competence of critical thinking. However, in both experiences we have observed in Agricultural Engineering, that when students evaluated their classmates, they did so based on their affinity with the person and not their work. For this reason, we believed necessary to advance in the evaluation, augmenting the rubric with a justification of the marks with a qualitative assessment. The aim of this teaching innovation project was to create an "augmented evaluation e-rubric" and its implementation in Degrees and Masters of Agricultural Engineering at the University of Valladolid. The teaching innovation project followed a linear methodology. In a first step, the teachers designed a subject practice to assess the competences that the students must acquire. The practice consisted in the analysis of the commercial strategy in social media of companies of the Agrarian sector. The three competences to assess were i) the critical thinking, ii) the capacity of summarize and iii) the ability of communicate in technical and non-technical forums. In the second step, the teachers created the "augmented e-rubric" that included a text box with the explanation of the evaluation marks, using CoRubrics tool. In the third step, the students presented their analysis to the group and evaluated, using the "augmented e-rubric", by teachers, self-evaluated and co-evaluated by students. Finally, the teachers discussed the results of the teaching-learning process. The results concluded that the students agreed to justify their evaluation. The students adjusted their evaluation to their qualitative assessments. Additionally, the teachers learnt new ways of evaluating considering students' own criteria. From the methodology point of view, the project allowed to advance in the competence-based assessment using a varied, diverse and innovative assessment tool with this augmented e-rubric.

Keywords: Innovation, technology, competences assessment, CoRubrics, Moodle.

## 1 INTRODUCTION

The European Higher Education Area (EHEA) promotes competence-based assessment using varied, diverse and innovative assessment tools [1]. In doing so, in previous teaching innovation projects, we developed rubrics to align the assessment with the competences that students must acquire [2]. In this line, it has been proved that rubrics allow the participation of all those involved in the assessment process [3] and to align the evaluation with the teaching-learning process in line with the European Higher Education Area (EHEA). The rubrics are tools that allow the students to follow up their own progress in the teaching-learning process favouring their own responsibility and to self-assess the quality of their work being conscious on the ways to improve it [4]. Moreover, we have developed in previous teaching innovation projects, subject's practices that allowed students to contact with companies and strengthen the competence of critical thinking G15. The subject's practice developed used social media, as a familiar and well-known instrument by students, to close the students to the labour market, make value judgments and reinforce the critical thinking competence [5]. However, in both experiences we have observed in Agricultural Engineering, that when students evaluated their classmates, they did so based on their affinity with the person and not their work. They did not consider the competences that students must acquire, misaligning their evaluation from the assessment required in the European Higher Education Area. For this reason, we believed necessary to advance in the evaluation, augmenting the rubric with a justification of the marks given by the student to their work and their classmate works. Then, the rubric is augmenting with a qualitative assessment. The augmented rubric in this teaching innovation project, allow the evaluator, reasoning the marks, to adjust the marks and be more objective in the assessment. In this line,

Zabalza [6] indicated that the evaluation by competences must be both, qualitative and quantitative. In the qualitative aspect, the rubric progressively determine the specific students' achievements in the teaching-learning process. In the quantitative aspect, the rubric relates those achievements to a numerical scale that determine the degree of progress. The development of this "augmented rubric" seeks to obtain, a varied and diverse evaluation tool in line with the European Higher Education Area (EHEA), based in the competences that the higher education students must acquire [1], considering that to assess the acquisition of social and cultural competencies in a community is necessary a qualitative assessment [7].

The aim of this teaching innovation project was to create an "augmented evaluation e-rubric" and its implementation in Degrees and Masters of Agricultural Engineering at the University of Valladolid.

## 2 METHODOLOGY

The teaching innovation project followed a linear methodology.

In a first step, the teachers designed a subject practice to assess the competences that the students must acquire.

The practice consisted in the analysis of the commercial strategy in social media of companies of the Agrarian sector.

The three competences to assess were,

- 1 G15: the critical thinking,
- 2 G3: the capacity of summarize and
- 3 G5: the ability of communicate in technical and non-technical forums.

In the second step, the teachers created the "augmented e-rubric" that included a text box with the explanation of the evaluation marks, using CoRubrics tool.

In the third step, the students presented their analysis to the group and evaluated, using the "augmented e-rubric", by teachers, self-evaluated and co-evaluated by students.

Then, the results were analyzed using SPSS software to obtain the frequencies of the marks as a quantitative analysis and using Tagxedo tool to obtain the clouds of concepts given by the students to their work and their classmates' works as a qualitative analysis.

Finally, the teachers discussed the results of the teaching-learning process.

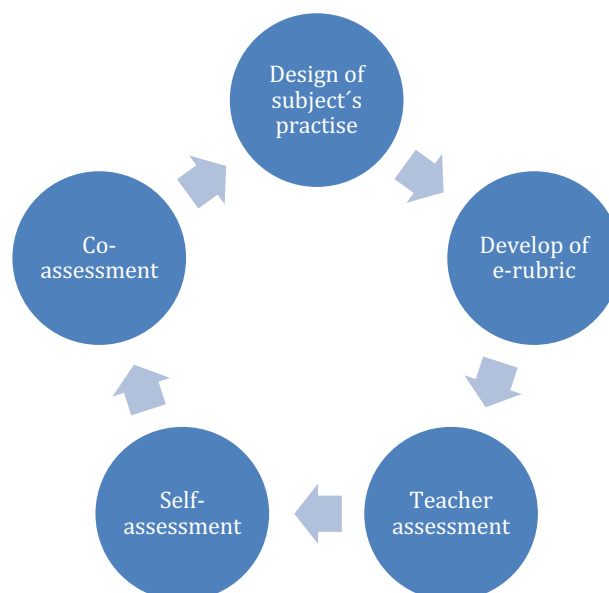


Figure 1. Methodology for the development of an "augmented e-rubric" with critical thinking to assess competences.

### 3 RESULTS

The results show in undergraduate students for the co-evaluation of their classmate that value more the formal and technical aspects in presentation than the analysis and critical thinking. It concludes that it might be necessary to insist in the critical thinking because students consider and value this competence least.

In the same line, positive comments prevail, only 8% criticize the work of colleagues, 7% the need to improve and 1% referred to the presentation and lack of synthesis. It is noteworthy, the little reference was made by the students in their comments, only 2%, to the punctuations, marks or scores, which is not what the students pay attention to. It concludes that students are more interested in learning than in scores or marks.

Table 1. Results of the qualitative analysis, year 2022-23 for undergraduate students.

N	Concept	Frequency	Percentage	Competence
1	Presentation/format/structure/communication/visual/explane	1787	0.23	G5
2	Work/product/information/status/commercialization/meet	1701	0.22	G3
3	Well	983	0.13	G3
4	Complete/deep/analysis/conclusions	786	0.10	G15
5	Good/correct	745	0.09	G3
6	Interesting/original/curious/unique/different	690	0.09	G15
7	Little/similar/missing/improving	522	0.07	G15
8	Social networks	323	0.04	G15
9	Marks/points	176	0.02	G5
10	Too much/elongated/no synthesis	80	0.01	G15

Competences: G15: the critical thinking, G3: the capacity of summarize and G5: the ability of communicate in technical and non-technical forums.

Moreover, it is noteworthy that only the 15.38% of the undergraduate students gave a valid self-assessment to their work. In most cases, the undergraduate students' comments were a justification of why they didn't do more for their work. It concludes that self-assessment can help the students to motivate and realize that they should try harder.



Figure 2. Cloud of concepts of the qualitative assessment for undergraduate students to assess competences.

It concludes that much more work would be done on self-assessment and critical thinking of oneself.

In the case of master's degree students, somewhat higher responses in the self-assessment was obtained, with 38% of valid responses.

Table 2. Results of the qualitative analysis, year 2022-23, for master students.

<i>N</i>	<i>Concept</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Competence</i>
1	Explanation/presentation/communication/format	1049	0.199	G5
2	Idea/product/work/strategy/distribution/project/work	1701	0.309	G3
3	Clear/correct/	734	0.131	G15
4	Innovative/different/creativity/alternatives/attitude	673	0.129	G15
5	Good/interesting/feasible	602	0.109	G3
6	Awareness/marketing/promotion/launch	513	0.091	G5
7	General/attention/compare/consistency	164	0.029	G15
8	Missed/Set/Time	82	0.014	G15
9	Social networks/media/survey	46	0.008	G15
10	Marks/points	38	0.006	G5

Competences: G15: the critical thinking, G3: the capacity of summarize and G5: the ability of communicate in technical and non-technical forums.

Master's degree students gave more value to, the presentation, the structure and the technical and economic feasibility of their and their classmates work. It concludes, again that the critical thinking competence still needs to be worked by students. Master's degree students was found are more cautious in giving superlative qualifications to their and their classmate work.

The comparison of the quantitative evaluation of undergraduate and master's students revealed that undergraduate students gave higher scores to the critical reasoning competence, while master's students to the competence of communicating orally in specialized and non-expert forums.

Table 3. Results of the quantitative analysis, year 2022-23, for undergraduate and master students.

<i>Competence</i>	<i>G15</i>			<i>G3</i>			<i>G5</i>			
	<i>Evaluation</i>	<i>Coev.</i>	<i>Self.</i>	<i>Teach.</i>	<i>Coev.</i>	<i>Self.</i>	<i>Teach.</i>	<i>Coev.</i>	<i>Self.</i>	<i>Teach.</i>
Undergraduate		7.59	7.86	5.68	7.54	7.71	6	7.48	7.71	5.92
Master student		7.64	7.87	5.88	7.65	7.73	6.12	7.67	7.87	6.12

Competences: G15: the critical thinking, G3: the capacity of summarize and G5: the ability of communicate in technical and non-technical forums.

This result might be explained because undergraduate students value critical thinking because they are conscious of the difficulty of this competence, and undergraduate students feel more confident to evaluate it.

Master's degree students gave somewhat higher scores than undergraduate students and this might be due to a greater confidence due to their level of studies. The students gave higher scores than the teachers confirming previous projects.

## 4 CONCLUSIONS

The results concluded that the students agreed to justify their evaluation. The students adjusted their evaluation to their qualitative assessments. Additionally, the teachers learnt new ways of evaluating considering students' own criteria. From the methodology point of view, the project allowed to advance in the competence-based assessment using a varied, diverse and innovative assessment tool with this augmented e-rubric.

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