Rubrics validation to improve teaching-learning process in laboratory subjects of the Chemical Engineering undergraduate degree of the University of Barcelona

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A rubric is considered as an educational tool that explicitly represents the performance expectations for a specific task or assignment. Basically, a rubric divides the assigned work into component parts and provides clear descriptions of the characteristics of the work associated with each component at varying levels of mastery [1]. To adapt practical subjects of the Chemical Engineering undergraduate degree of the University of Barcelona (Spain) to the European Higher Education Area, rubrics were gradually introduced to practical subjects during the three academic courses (2009-2012) [2]. Tasks and activities ("experimental design and experimental error" written composition, laboratory reports construction by means of wikis, oral presentation, and collaborative work assessment) to be assessed by rubrics were previously chosen and the rubrics construction was done by means of stating the purpose and the learning objectives and developing scoring criteria that address each objective.

Rubrics were introduced in laboratory subjects with the intent that: 1) to communicate to students the specific requirements and acceptable performance standards of the assignments; 2) to provide formative feedback to support and guide ongoing teaching-learning efforts of both instructors and students; and 3) to ensure consistency across multiple graders (other instructors, teaching assistants, etc.) according to an explicit and descriptive set of criteria that was designed to reflect the weighted importance of the objectives of the assignment. In this way, the instructor's grading standards don't change over time because of fatigue, shifting standards based on prior experience, or intrusion of other criteria.

During the 2012-2013 academic course, when the revamping process of teaching-learning methodologies in laboratory subjects of the undergraduate degree was completely implemented for their adjustment to the Bologna Process, instructors and students were queried about the rubrics using offline survey forms to gather evidence that supports the appropriateness of them. That "preliminary" validation was mainly focus on examining content, construct and criterion, and identifying of previous adquisition/development of the same competences in other subjects within undergraduate program in order to adjust the didactic instrument [3]. Validation analysis allowed to infer that the use of rubrics was satisfactory in terms of increasing consistency of scoring between raters, facilitating valid judgment of competencies by identification of students' strengths and learning needs, promoting students' learning and improving instruction. As a counterpart, it was detected that students did not get used to work with rubrics. Despite of the fact of the use of rubrics improved global academic results (general and transferrable competences acquisition/development and students' marks); several students reported not find the qualities

in their work even if they know what to look for, since they have a less developed sense of how to interpret criteria. Furthermore, students did not completely engage in the innovation of their own learning process, their participation in validation process was around 68%. Although this percentage seems to be reliable to get conclusions, in some cases gathered information was missing which might made that results of this preliminary rubrics validation analysis were biased. As a consequence, for subsequence academic courses, the methodological changes in the use of rubrics have been focus on the refinement of its content and criteria according to detected strengths and weaknesses in the teaching-learning process, and on the enhancement of the ensuing validation process that will include students and raters.

With this purpose, for the current 2013-2014 academic course, reconstructed rubrics have been used in laboratory subjects. Their validation process has been modified in several ways: 1) validation survey has been reformulated in terms of clarity, wordiness, negative wording, appropriateness of responses listed, balances, etc.; 2) information has been gathered by means of an online survey available via Moodle in the subject virtual environment; and 3) the process includes a student of the laboratory subject as a peer consultant in order to help instructors to formulate the queries to students as well to motivate classmates to engage in validation process. Nowadays, the process of collecting information has just been finished and its analysis, which constituted a second cycle in rubric validation process, is starting up.

References

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