Emarking: A collaborative platform to support feedback in higher education assessment

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Abstract. This article reports on six years of experience on the continuous redesign and implementation of a collaborative marking platform to support summative and formative feedback in higher education. The design follows principles of feedback quality, collaboration between teachers and students, and institutional requirements for administrative features. The platform includes modules for printing management, scanning support, on-screen-marking, markers training and peer reviews by students. The goal of the platform is to reduce the cost of providing quality feedback by the reuse of annotations and comments, the use of rubrics, and the collaboration between markers, which can monitor inter-rater agreement through real marking processes.

Keywords: Electronic feedback·collaborative marking·emarking

1 Introduction

The importance of open-ended questions for both summative and formative assessment, have been thoroughly studied in higher education scenarios, and consequently its use has grown in demand in universities around the globe. The value of open-ended questions like essay writing, mathematical demonstrations or concept maps, is that they demand higher cognitive skills form students, like synthesis and the linking of ideas in a coherent whole [1]. However, the quality of such assessments is not guaranteed by the questions themselves, but on the quality of the summative and formative feedback given. Summative feedback, in the form of grades, must be reliable and valid, as they have strong consequences in the life of students [2]. Formative feedback, on the other hand, should be nonevaluative, supportive, timely and specific, as it is expected to support students on their learning [3]. Providing feedback that considers all these dimensions demands an important effort from lecturers, tutors and administrative staff, making low quality feedback a reality in many institutions. Despite recent developments on sophisticated electronic tools to support assessment, to the extent of our knowledge, none of them is concerned with the dimensions of feedback quality, and therefore

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they do not provide support for those tasks [4]. A second problem is that no tools provide ways to collaborate between tutors and lecturers, which leaves the potential that collaborative environments have outside the feedback process. Finally, as assessment is a key institutional process within educational organizations, technologies must meet enterprise requirements like security, reliability, scalability and ease of adoption. The latter is a key aspect for educational technologies, as proctored hand-written exams are still the most common way to assess students in high stake exams, particularly in developing countries. In this article the Emarking platform is presented, which is the result of six years of experience on the continuous redesign and development of a software to support the collaborative assessment marking process of open-ended questions [5].

2 Theoretical framework

2.1 Quality of feedback dimensions

Feedback can be summative (grades) or formative (annotations and comments). Summative feedback quality dimensions are: Validity and reliability. Validity is the extent to which an assessment measure what it is supposed to measure. Reliability is the consistency by which an assessment is applied to different subjects and marked by different judges. Validity is usually measured against expert consensus reached following a specific process like Delphi. Reliability is measured calculating inter-rater and intra-rater agreements [2]. Formative feedback quality dimensions are: Nonevaluative, supportive, timely and specific. Nonevaluative refers that it should not produce a grade, as its focus is on learning. Supportive is the extent by which the feedback helps students on improving, not only on identifying mistakes, but also providing ways to tackle those mistakes. Timely refers to the timespan between producing the object to be assessed and obtaining the feedback, which shouldn't be immediate, in order to support reflection, but not too late, so students can link the feedback to their performance [3].

2.2 Enterprise systems architecture

Enterprise systems pose demands to software design and development that are not necessarily related to its core function. In the case of a marking platform, the most relevant features are the students' work and the teachers and tutors' feedback. However, academic institutions require their assessment processes to be reliable and secure, demanding platforms than can support thousands simultaneous students being assessed, with no loss of data. For Emarking, its design was originally

ideated as a plugin for an Open Source Learning Management System Moodle platform, which is a state-of-the-art system that currently supports teaching and learning processes worldwide.

2.3 Collaboration

Researchers have shown that collaboration usually outperforms cooperation and individual performance in many tasks, arguing that collaboration is a richer process than traditional communication, adding that collaborative groups are innovative, productive and have a greater level of satisfaction [6]. We argue that the marking process can be thought as a collaborative task, one in which markers collaborate towards a common goal: To produce a high-quality marking work, i.e. an excellent inter-rater agreement and quality formative feedback.

3 Platform description

3.1 Printing module

The printing module allows teachers to upload an exam as a PDF file, which is securely sent to the server, notifying academic coordinators and admin staff. All information is sent encrypted, and none of the roles, not even the teacher herself can download the exam. The platform connects directly to the printer, using an encrypted protocol, and depending on the capabilities of the printing machine, printed exams can be safely stored inside a sealed envelope. If the printing facilities do not allow printing directly from the server, admin staff can download the exam using a two-factor authentication code sent to a mobile phone. Once printed, the sealed envelopes can be delivered to teachers and tutors, whom can rely on the seals to trust their printed exam to be taken.
When creating a new Emarking activity, only two pieces of data are required: A name for the activity and the PDF file of the exam. The exam date allows to implement a minimum period to ensure printing capacity, facilitating the work of administrative staff (enhancing adoption). Admin staff can also be assigned to course categories, which can be used to organize courses according to academic periods and faculties (p.eg: Fall 2019 Economics). An optional parameter at this stage is the personalized header, which corresponds to print a unique copy of the exam per student, with a header including the student name, id and photograph (if available). This parameter must be set if students are expected to answer the exam by hand, and their answers will be uploaded to the system for electronic marking or if they were previously marked by hand.

Finally, reports on the number of pages printed per course, per teacher or department can help management decisions on budgets and printing providers.

3.2 Scanning module

Emarking implements the possibility of uploading students' answers for electronic marking or marking manually and upload the marking results to the platform for distribution of the results and feedback. In order to use this feature, the printing stage must be used with a personalized header, which adds two QR codes to each page (one in the top-right corner and a second in the bottom-left corner), allowing the system to automatically identify its owner, rotate the page or categorize a page as problematic one (orphan page). Finally, in order to ensure scalability, the server does not process exams immediately but in a background process that allows the use of computer processing during idle moments.
Even though the efficacy of the QR codes processing has reached almost 99%, there is an interface to manually identify orphan pages that Emarking could not automatically identify in which the teacher or a tutor can identify the student from the official list and indicate the page number of the unidentified page.

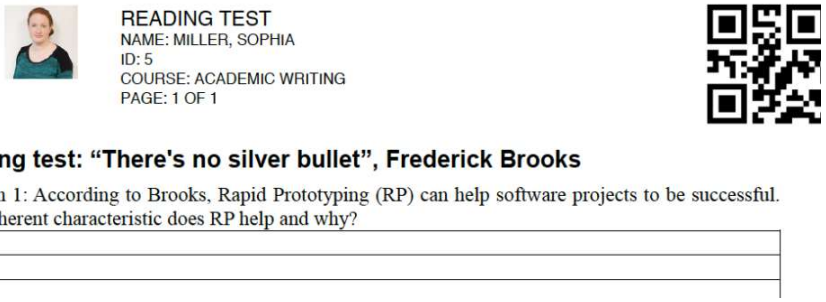

Fig. 1. Personalized header including QR code for scanning.

3.3 On Screen Marking module

Emarking has most of its benefits when marking on-screen. The course main interface shows all the students enrolled in a course and the potential markers for the activity. A "Mark" button next to each student opens the OSM interface, shown in figure 2, which includes the rubric, a set of reusable comments and the student's work. The reusable comments include all comments made by any marker involved in the marking process of an exam along with a set of predefined comments, that teachers can create based on common mistakes that are expected to appear. The interface for creating predefined comments is simple and it allows pasting from

Excel. The rubric is configured by the teacher which can also be imported from Excel for ease of use.

As in higher education assessment processes can be numerous and complex, in which thousands of students are organized in parallel classes, and exams can be long, including several pages and criteria in the rubric. The marking process requires a sophisticated organization and planning. Emarking allows to allocate markers and pages per criterion, allowing to organize marking groups per question or part of a high-stake exam, facilitating the visualization of the marking process. Another relevant aspect for reliability is that the marker should not be able to identify the student she is marking. As the personalized header position is known, an anonymous version of the exam is produced at scanning time, and therefore avoid any judgment problems by making the process fairer.

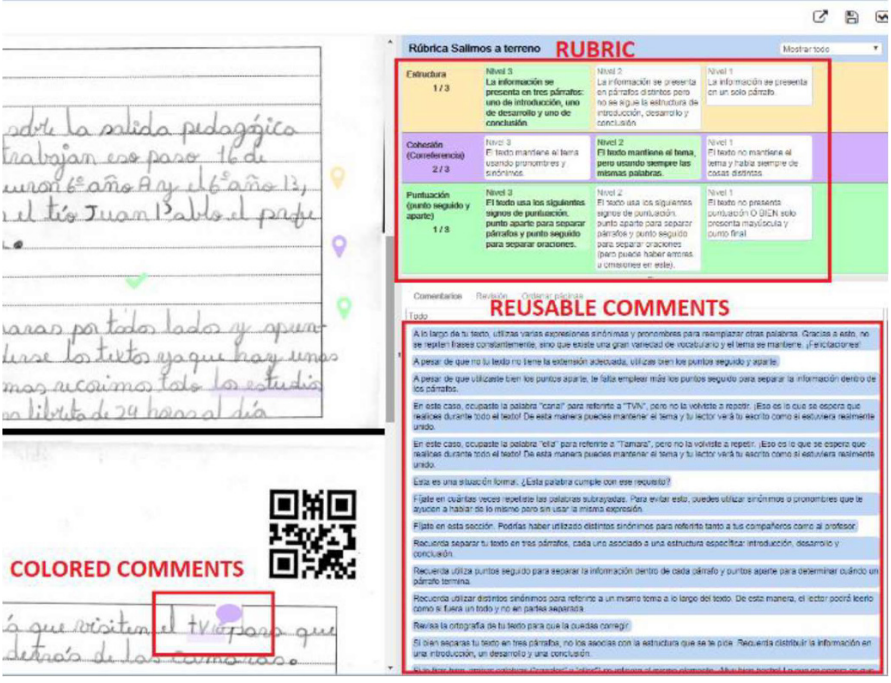

Fig. 2. On Screen Marking interface showing colored annotations and comments, reusable comments and the rubric.

3.4 Markers training

In order to improve the validity and reliability of marking processes, assessment instruments (exam questions and rubrics) must be tested and markers must be trained. The platform implements the Real Time Delphi methodology to train markers on the application of a rubric on a set of exams. Such a process requires a

group of judges to assess a decision through rounds until they reach consensus. In a marking process, markers are judges, and the decisions are the selected criteria in the rubric. The platform implements a blind marking as first stage, followed by a continuous iteration lead by inter-rater agreement indicators, along with tools for collaboration between markers like chat and a group view of consensus.

3.5 Peer review

Teachers can configure an Emarking activity for students to assess each other in anonymous pairs. In this case, student answers can be scanned and uploaded or imported form another Emarking activity. The system will randomly assign students in pairs and the interface will use anonymous marking for them to assess their peers' work.

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References

[1] B. Paltridge, "Academic writing," Language Teaching, vol. 37, pp. 87-105, 2004.

[2] E. E. Hansson, P. J. Svensson, E. L. Strandberg, M. Troein and A. Beckman, "Inter-rater Reliability and Agreement of Rubrics for Assessment of Scientific Writing," Education, vol. 4, pp. 12-17, 2014.

[3] V. J. Shute, "Focus on Formative Feedback," Review of Educational Research, vol. 78, pp. 153-189, 2008.

[4] E. Heinrich, J. Milne and B. Granshaw, "Pathways for improving support for the electronic management and marking of assignments," Australasian Journal of Educational Technology, vol. 28, pp. 279-294, 2012.

[5] J. Villalon, "An eMarking tool for paper based evaluations," in Proceedings of the 12th International Conference on Advanced Learning Technologies, 2012.

[6] A. Meier, H. Spada and N. Rummel, "A rating scheme for assessing the quality of computer-supported collaboration processes," International Journal of Computer-Supported Collaborative Learning, vol. 2, pp. 63-86, Mar 2007.