How educators value data analytics about their MOOCs

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Abstract. A range of data analytics is provided to educators about the profile, behavior and satisfaction of students participating in a Massive Open Online Course (MOOC). However, limited research has been conducted on how this informs the redesign of next MOOC editions. This work-in-progress paper presents a study of 4 MOOC educators from Universitat Pompeu Fabra regarding 3 MOOCs offered on the FutureLearn platform. The objective was to evaluate the usefulness and understandability of different types of data analytics of the courses they have offered with respect to specific monitoring goals. Preliminary results show that educators perceived the same information sources and data visualizations differently, satisfaction surveys and comments in the forum were among the most useful information but it was difficult to associate data analytics with the monitoring goals. Further studies for the alignment of educators´ monitoring needs for redesign purposes and the development of appropriate support tools are suggested.

Keywords: educators in MOOCs, data analytics, redesign, monitoring goals

1   Introduction

Recent research in the use of data analytics in Education proposes the presentation of valuable information to students and educators for making informed decisions in the design and use of digital learning environments. For instance, by being aware of their actions, students can have a better control over their own learning and they can associate the presented data to achieve learning goals. In the context of Massive Open Online Courses (MOOCs), educators are in the position to reflect on their course with a variety of data sources. This implies to monitor the learning process, to identify difficulties and problems and to improve the learning environment [1]. However, the lack of face to face interactions between students and teachers, as opposed to conventional courses, hinders their communication and it becomes difficult to assume in design time how the massive amount of students will respond to certain learning activities. One approach is to analyse the learning design of the MOOC so that the provided data about students can be interpreted towards course redesigning purposes [2].

  Common information sources in MOOCs are students´ profiles and their previous experiences, clickstreams with the videos, patterns of students´ activities, and comments in forums and students´ surveys [3]. Recent paradigms of MOOC dashboards aim to display this information to teams of educational practitioners who are involved

in the development of the MOOC towards supporting their evidence based decision making [4]. However, in the specific case in which the MOOC has finished, less research addresses the usefulness of the provided data analytics for the redesign purposes of courses. Studies in distance and online learning indicated that educators value data insights about the performance of students and their common misconceptions, the material viewed according to the schedule and the forum behavior [5-6]. One survey study evaluated the opinion of 92 MOOC educators for the usefulness of common information sources and their association with specific monitoring goals [7]. The results indicate that the most useful information sources were the discussion forums but quantitative measures were insufficient to identify problems and potential improvements in the MOOC. A limitation of this study is that educators were not equipped with the real data about their students but with synthetic data visualizations that could potentially inform the development of information display tools for educators.

In this paper, we focus on the FutureLearn platform which is based on a social constructivist approach which aimed at promoting social learning within MOOCs. Special attention was given towards the role of educators and how they can improve. For the facilitation of course evaluation, MOOC educators were provided with three summary reports before and after their course including: 1) a pre-course survey which includes data about the previous experiences and motivations of students to participate in the course; 2) a course report which shows the cumulative growth of enrolments and panel data analysis for the activity patterns of students, their comments, responses in quizzes and tests, and 3) a post-course survey summary that presents the satisfaction of students with the course, educators and the platform. The two surveys´ summaries were visualized in the form of bar charts complemented with the related data tables. The course report included a variety of visualizations (see Figure 1).
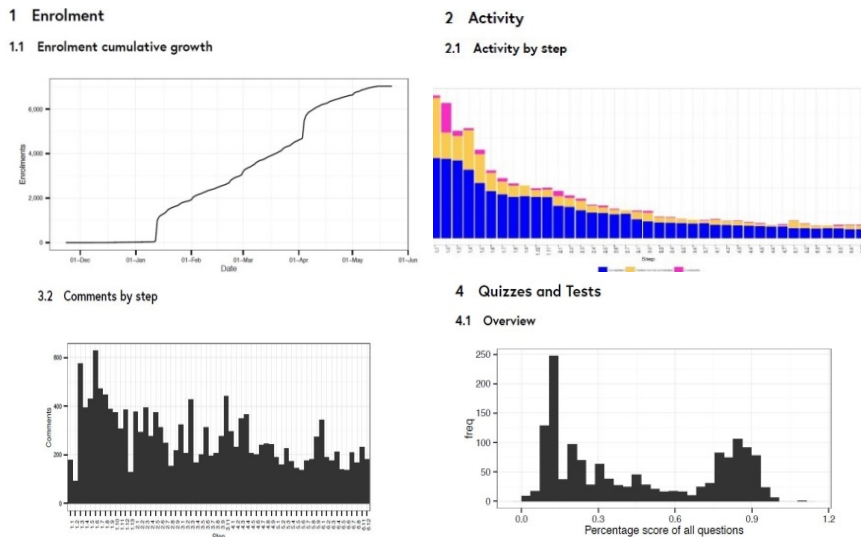

Figure 1. Sample visualizations in the FutureLearn course-report showing enrolment cumulative growth and analysis of activity, comments and quizzes and tests during the course.

The aim of this paper is to evaluate educators' opinions about the specific summary reports provided by FutureLearn and to understand their usefulness to identify ideas in an informed redesign of the course. That end, we analyzed the usefulness of this range of data for specific monitoring goals [7] like diagnosing problems with tasks-activities. Our research questions are:

RQ1: Which information sources and visualizations (from FutureLearn reports) are most useful for MOOC educators?

RQ2: What information sources (from FutureLearn reports) help MOOC educators to identify problems and potential improvements in a redesign of the course?

2 Methodology

A survey study was carried out to evaluate the usefulness and understandability of these three summary reports from MOOC educators with respect to the redesign of next MOOC editions. The survey was based on the study of Stephens-Martinez, Hearst & Fox [7] who evaluated the opinions of 92 MOOC educators. The authors formulated certain monitoring goals as common quantitative or qualitative assessment of educators in a MOOC which becomes relevant in our case for course redesign purposes. The monitoring goals were related to the learning activities, the material and its appropriate presentation including: 1) Problems with the activities-tasks, 2) With what students struggle, 3) Appropriateness of course difficulty, 4) Most difficult part of the course, 5) Improving the presentation of a topic, the students´ engagement including: 6) Engaging content for students, 7) Least interesting content and the grading tasks in MOOCs including: 8) Difficulty of the grading activities.

The procedure which we followed consisted of two parts. At first, we searched for educators who offered MOOCs at Universitat Pompeu Fabra and we selected the courses whose first editions were already completed and all data report summaries were available. We sent an e-mail to the MOOC educators involved in these courses with an explanation of our study, the three summary reports about their own MOOC and a questionnaire. The questionnaire, based on the approach followed by [7], included a first part with demographic information about the educators and their previous teaching experience in MOOCs. The second part included questions about the usefulness and understandability of the information sources and the basic visualizations provided in the three reports followed by open-ended questions. In the third part, the educators were asked to repeatedly respond on the usefulness of the information sources for the 8 monitoring goals followed by open-ended questions. To simplify the three summary reports and to present some visualizations in the questionnaires we divided them into the following segments with specific focus on the course summary report: Pre-course survey: a) previous experiences of students; Course report: b) enrolment cumulative growth, c) activity patterns by step, d) comments by step, e) quizzes and tests; Post-course survey: f) students' satisfaction.

3   Results

All MOOC educators (*N=4*) had experiences in the development of a MOOC as they have already finished two editions of their own course. The titles of the three MOOCs were the following: "3D Graphics for Web Developers", "Why the European Union? A brief history of European integration", "Introduction to Catalan Sign Language: Speaking with your hands and hearing with your eyes".

Educators indicated that students´ satisfaction was the most useful information source, although all the information sources were appreciated with ratings over medium or somewhat useful. In some cases like (a) the previous experiences of students and (e) the analysis of quizzes and tests, the opinion of MOOC educators was different ranging between low vs. high usefulness or uncertainty for their usefulness. The easiest to understand and interpret were the (a, f) surveys´ summaries while some difficulties were present for the provided visualization in the (c) activity patterns by step and the (e) quizzes and test. Further, the responses of the 4 MOOC educators differed (e.g. different responses for the understandability of visualizations for the activity patterns of students).

With respect to the monitoring goals, the results show limited application of the information sources as in each case the 34% to 60% of them were not applicable and the 22% to 28% of the responses were neutral meaning they were not sure how to associate them with monitoring goals (see Figure 2 pattern fill and light color). Figure 2 shows that (f) student's satisfaction and (d) comments by step were perceived more useful information for the monitoring goals (dark color) compared to the other sources as they were strongly appreciated in 41% of the monitoring goals.
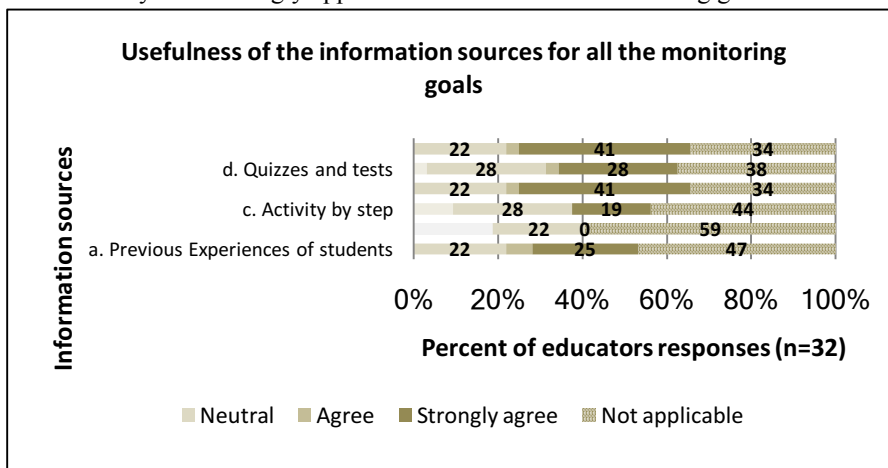

Figure 2. Usefulness of each of the information sources for all the monitoring goals.

Figure 3 shows further the 8 monitoring goals (numbers from 1-8) and the usefulness of all the information sources. It was more difficult for educators to associate the provided data analytics with (3) the difficulty of grading activities and (8) the least interesting content as all the information sources were not applicable for more than

55%. The information sources were strongly appreciated in about 35% in issues like (4) the appropriateness of the course difficultly, (6) the most difficult part of the course, (2) with what students struggle and (5) the most engaging content of the students.
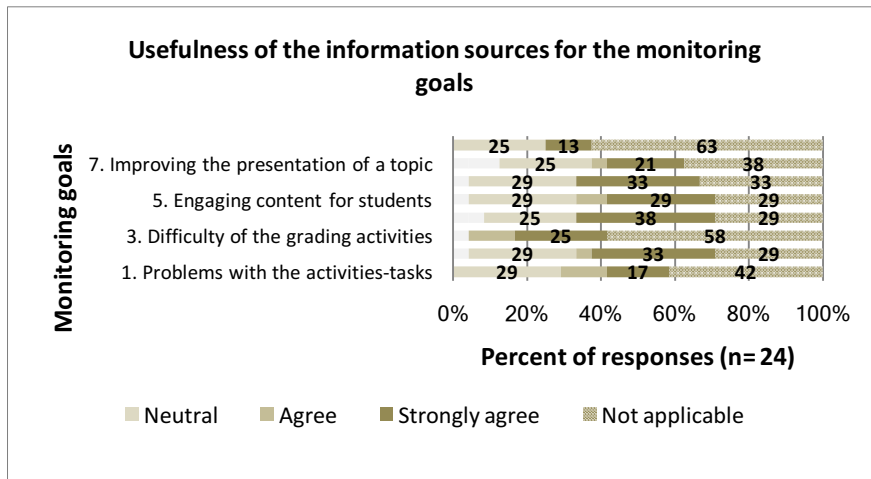

Figure 3. Usefulness of all the information sources for each particular monitoring goal.

In the open-ended questions, participants mentioned that all the graphs which included time as a variable were particularly useful and the set of data tables provided in combination with the visualizations were appreciated. Second, visualizations about the active learners were considered in the development of the next edition of the MOOC as well as the attempts to correct answers in the quizzes helped to re-design the quizzes for the next edition. The participants pointed out that all the information sources were considered in the next edition of the MOOC but as complements. The final decisions for re-designing of their MOOC were taken after discussions carried out with the team of educators involved in the production of the MOOC and Future-Learn platform. According to two educators, some changes in the next editions based on the provided data were to simplify the content of the MOOC and to intervene in specific parts of the course which were determined as important from the educators´ team. Finally, one of the educators proposed, further visualizations might help them in their final decisions. For instance, interaction analysis of participants based on their comments and the specific words in the provided sentiment analysis from Future-Learn will provide more insights.

4   Conclusions and Future Work

Results indicated that educators perceive specific information sources useful, with some divergences in some of their opinions. Further studies need to evaluate larger samples of educators and how their background and the different contexts (topics, learning design, and audience characteristics) of their courses influence the interpreta-

tion of the provided data analytics. Second, preliminary results shows that educators were struggling to associate the application of the information sources to the monitoring goals which might shows a gap between the educators´ needed information and the provided data analytics reports. The most applicable information sources for the presented monitoring goals were students´ satisfactions and comments in the forums, which is aligned with the results in [7]. Future studies should also consider monitoring goals defined by the educators before the collection and presentation of data. Finally, educators reckoned that information sources and visualizations were useful as a complement for determining the changes in the next edition as they took more into account the observations and conclusions by the team of MOOC educators in charge of the MOOC and the advices from the MOOC platform. Limitations of this study include a less number of MOOC educators and relatively a low number of participants in the MOOC survey reports. However, this study overcame a limitation of the previous study in [7] by presenting to MOOC educators analytics of real data, from learners in their own MOOCs. Further research should also study the specific actions in the redesign of a MOOC that educators perform as a result of the awareness provided by the data analytics of past cohorts of MOOC students.

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