Category: Innovative Use of Digital Learning Environments

Title: Will Open Response Assessments help application and assessment of qualitative content in MOOCs?

Author(s): Alexis Bateman, Eva Ponce, Chris Caplice

University or Organization: MIT, Center for Transportation & Logistics

Abstract

An existing challenge in MOOCs is the ability to have students apply open ended concepts from a course and assess that application of knowledge. In classroom settings, an instructor can call upon a student to answer a question in class or ask them to submit a written response. MOOCs create a barrier to these type of approaches because of the number of students in the course. Instructors are typically unable to individually assess each student's application of course concepts through verbal or written communication. However, there is still a need for students to apply concepts from a course in a more critical thinking way than the traditional approach of checkbox or multiple-choice questions. One way to have students apply concepts while grading at scale is to include open response questions (ORA) with peer assessment. In this study, we explore the introduction of ORAs in a MOOC setting, examine student performance and student perceived value, and conclude with continuing opportunities for improvement.

Introduction

Within the MITx MicroMasters in Supply Chain Management Program – a massive open and online education program – there are five courses and a final exam. While much of the program is quantitative, some of it is conceptual and qualitative. This type of information is difficult to have students demonstrate conceptual understanding beyond checkbox and multiple-choice questions. To address this issue, we introduced in CTL.SC3x – Supply Chain Dynamics an open response style question that allowed students to submit open response to more sophisticated question prompts. This type of problems, also referred to as open response assessments (ORA), asks students to read a prompt and then answer it in paragraph format using content from the lesson. Having learned from using this type of question in the past runs of courses in an ungraded format, the process was refined with more explicit instructions of how to read and interpret the questions prompt and answer the question using course material. In addition, we learned that a very detailed rubric which outlined what a good answer should include was one of several keys to success in this type of problem for the students.

While, offering open response problems is a solution to asking students to apply concepts learned in the course, the open response format of submissions does not lend itself easily to automated grading at the scale of a MOOC. To address that issue, we introduced peer assessment where students are trained to grade their peers to receive full credit for the problem. The students are asked to review several sample answers that range from poor to excellent on various components of the rubric, and then are asked to assess those answers using the rubric. Their assessments are calibrated with how the instructor has scored those answers. Once they correctly calibrate with the instructor, they then need to assess their peers as a part of their overall score for the ORA question.

This paper explores our journey through the development and process of using the ORA learning and assessment tool in SC3x. It then further explores three main questions:

1. Based on the design and structure, how do students perform with ORAs in the course?
2. Do students perceive a value in the ORA for deeper application of concepts in this course setting?

3. What are existing limitations of the ORA and what are potential solutions to resolve them?

Early Findings

There were several early learnings we were able to see with student performance (see Figure 1). The first ORA included in the course was ungraded and open to both audit and verified students to allow for practice – so more people attempted it but also did not complete the peer assessment portion. But for ORA 2, 3, and 4, the portion of students completing the ORAs went down significantly. By the 4th ORA, a little over half of verified students completed the assignment (248/591). In addition, the ungraded ORA has a wider distribution of grades than the graded ORAs, the distribution of scores reduced as the course went along.
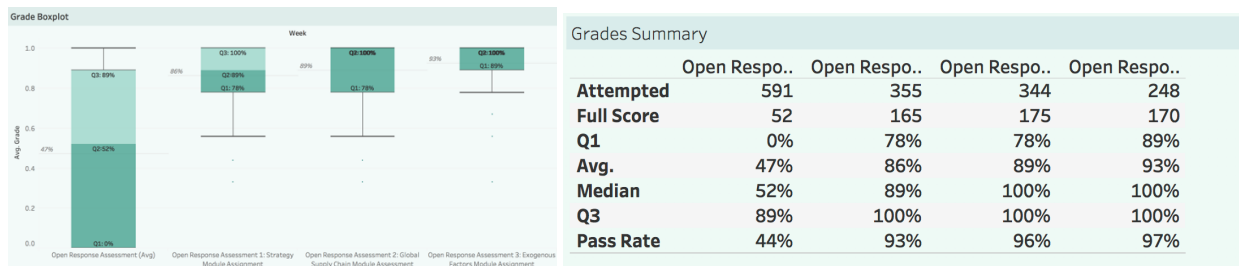

Grades Summary	Open Respo..	Open Respo..	Open Respo..	Open Respo..
Attempted	591	355	344	248
Full Score	52	165	175	170
Q1	0%	78%	78%	89%
Avg.	47%	86%	89%	93%
Median	52%	89%	100%	100%
Q3	89%	100%	100%	100%
Pass Rate	44%	93%	96%	97%

Figure 1: Student Performance for CTL.SC3x ORA Assignments

Following the close of the course, we surveyed the students about their practices in the course and their perceived learning value of different tools included in the course. For one question, we asked the students to rank how much a course component helped them learn and apply concepts from the course. The ranking was from 1 (Not at all) to 5 (Significantly). With 256 surveyed, the mean for ORAs was 3.52 with a standard deviation of 1.12 and variance of 1.26. We also assessed what part of the ORA process was perceived as the most valuable and also invited open feedback on this problem type.

Summary early learnings include:
- Student completion rate of ORAs reduced as the course went on
- Grade averages increased with more exposure to ORAs
- Students perceive ORAs as above average as contributing to their learning but there was a significant variance in the ratings
- There is some negative perception of being graded by peers stated in open feedback but only four students requested regrades through the help email

Continuing Explorations

As we continue to analyze data, we will explore the introduction of ORAs as a graded course component and how it impacted the students. We will seek to understand how students completed the ORAs in practice, what types of students performed better, how it impacted their learning, and how the design and structure can be improved in further uses of the learning tool for application of concepts.