Exploring the Effects of Lightweight Social Incentives on Learner Performance in MOOCs

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Abstract
We are exploring the effects of social incentives and
motivation on learner performance in a massive open
online course. In the preliminary study that we report
here, we asked learners if they wanted to be considered for
a community TAship in a subsequent offering of the
course, if they finished in the top 20% of those who
completed the current course instance. We prompted
students near the beginning of the course and in the
middle of the course. This prompt appears to have had a
significant, albeit small effect on learner completion when
given early in the course. The prompt had no significant
effect when given later in the course. We also discuss our
plans to follow-up this study.

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Incentives, Completion, Community TAs

ACM Classification Keywords
K.3.1 [Computer Uses in Education]: Distance learning

Introduction
Massive open online classes (MOOCs) have high drop out
rates. Wilkowski et al. (2014) found, in one MOOC, that
only 25% of students who claimed they wanted to earn a
certificate actually earned one. [4].

Examining MOOC attrition rates, Clow noted that the steep decline in participation mirrored that found on social media websites [1]. This steep drop off is well known in marketing circles as "The Funnel of Participation". Clow hypothesised that the open nature of MOOCs – the ease of entry and the ease of exiting – which is similar to social media, was largely to blame. He noted that courses for online universities, presumably somewhere between traditional classrooms and MOOCs in terms of openness, have higher attrition rates than traditional classes but lower drop-out rates than MOOCs. These findings are also consistent with Clow's hypothesis that attrition and ease of exit/entry are linked.

There is evidence that the ease of exiting a MOOC can be curtailed by introducing more social accountability. An analysis of student motivation surveys across several courses by Kizilcec and Schneider in 2015 found that having a friend take the course was more predictive of earning a certificate than wanting a certificate at the beginning of the course [2]. Yang et al. had a similar finding in 2013. They examined the forums to observe the drop-out patterns of all students (not just those who respond to surveys). They found that students who became engaged with other students in forums performed better in a MOOC than those who did not [5].

This leaves us with the challenge of introducing social accountability for all students. Krause and Williams found that retention in a MOOC was improved by making the course more game like. Adding the social element of competing against other students further increased retention [3]. Our study examines whether similar results can be achieved without redesigning the entire course.

Method

We hypothesised that students would do better if they were given a social motivation. Our case study was the third offering of an introductory programming MOOC (Introduction to Programming with MATLAB by Ledeczi, Fitzpatrick, and Tairas; Vanderbilt University). In all offerings, this course had active volunteers called community TAs. These volunteers were often thanked profusely for their contributions on the forums. They clearly had high social status. Moreover, in the post course survey for the first offering, many students indicated interest in becoming community TAs for future offerings.

We constructed the following message to send to students in two experimental groups of the third offering.

> If you complete this course in the top 20% of those who complete, would you like to be considered for a Community TAship in a subsequent offering of the course? Your response to this question is optional, and your response, if any, will have no effect on your score in the course.

The experiment included all students who signed up for the third offering at least a day before the first assignment was due. For the first round of the experiment, we partitioned students into two equal size groups. Each group received equal numbers of signature track students. The experimental group (n=7257) received an email with the message above on the day before the first assignment was due. They were given a link to respond to the question on the Coursera platform.

After the deadlines for the first two assignments passed, we ran a second round of the experiment. Students from the first control group (n=7258), who had completed both assignments (n=593) were divided evenly into experimental and control groups. A diagram showing the groups for the two experiments is shown in figure 1.
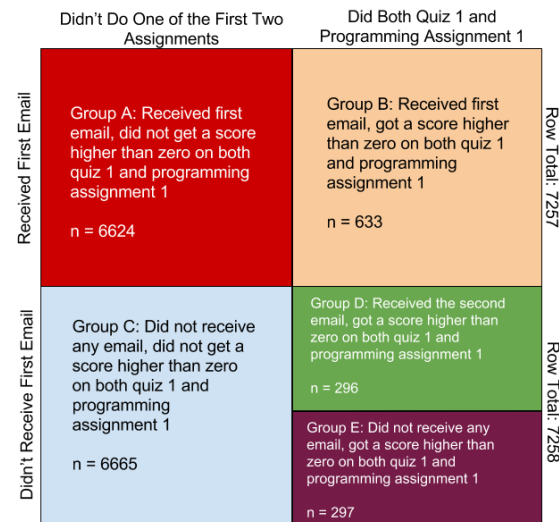

Figure 1: A diagram of how students were broken into control and experimental groups.

After both the initial email and the second email, we assessed the participation levels of each group on each subsequent assignment of the course's third offering.

Results
We found that the first email had a slight, but significant positive impact on completion of the final assignment (p=0.057). It had no significant impact on completion of any of the earlier assignments. This surprised us since we

had assumed any impact would be concentrated in the assignments immediately following the email. The results for the first experiment can be seen in figure 2. In retrospect, this effect on the final assignment could be the result of gradual attrition among students, but at a slower rate for those who were prompted than for those who were not prompted, with the result that a significant difference in completion rates only manifests in the final assignment. An alternative analysis might look at the slope of attrition rates in the two conditions, asking whether there is a significant difference in slopes.
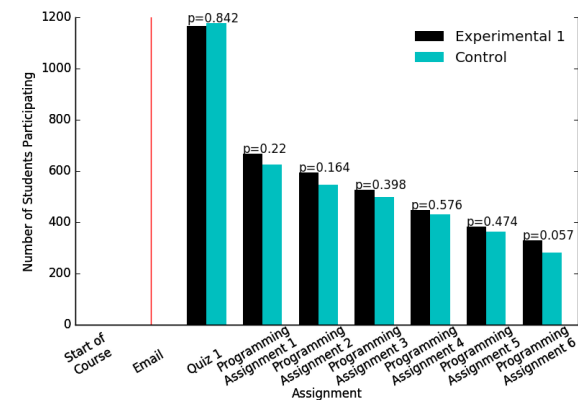

Figure 2: The number of students who participated in each assignment. This is a comparison of students who received the first email to students who did not. These groups correspond to the rows in fig 1. The p values are shown above each bar.

The difference in participation was not significant for any of the assignments in the second experiment. It could be that interventions later in a course have a smaller impact than those earlier in the course. Perhaps more exactly, the intervention has a larger effect on those who are "on the

fence" than those who are already committed to finishing or unable to for "hard" external reasons. We hypothesize that the second prompt might have had more impact if it included students who had done only one of the first two assignments, as these students would be more likely to be "fence-sitters". More generally, we will want to characterize different populations of learners, from "committed" to less committed, and look at effects on these different populations.

There are some other smaller points of note. Recall that students who received the email prompt were asked, but not required, to follow a link to indicate interest in a Community TAship. There were no significant differences between students who followed the link to the survey and those who did not. For a larger sample, we may find a difference as following the link may indicate how much an incentive our email prompt is to different learners. In addition, because the email prompt pointed to a survey on the course platform where learners could indicate their interest in a Community TAship, there were some students who did not receive the email and found the survey after completing the course. We hope to make our survey harder to stumble upon in future experiments. This was not a population included in our analysis. It was small (n=90) relative to the size of the experimental and control groups.

Having issued the prompt for interest in a Community TAship, we are defining a vetting process to select among those who finished in the top 20% and said they were interested, in preparation for the fourth course offering.

Conclusion and Future Work
Our work thus far is quite preliminary, providing evidence that encouraging students to have a social goal does have a slight positive impact on participation if given early in the course. This impact is quite small compared to the effects reported by Krause and Williams but our intervention was much easier to implement.

In the future we plan to examine whether in prompting students even earlier (i.e. before the course starts) shows a larger effect than we saw here, and additionally identifying different populations of learners for which particular possibilities, notably the possibility of a Community TAship, are in fact incentives (or not). Additionally we will look into some other interventions that can be easily added to existing courses.

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