

Survey Nonresponse and Student Engagement in MOOCs

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While the popularity of MOOCs (Massive Online Open Courses) is increasing among traditional and nontraditional university students, relatively low completion rates are often mentioned as a key point of criticism. However, there is a growing body of research aiming at a better understanding of the heterogeneity of learners and their participation (Koller, Ng, Do & Chen, 2013; Kizilcec, Piech, & Schneider, 2013). Given different backgrounds, diverse intentions, skill levels, and constraints of learners, a prerequisite for further improvement of MOOCs is to understand how different subpopulations of learners interact with the course components (Kizilcec et al., 2013). To address this problem, researchers and practitioners use two main types of data: learning analytics (see Long & Siemens, 2011, p. 34) and survey data. Although learning analytics provides new and innovative ways of measuring learning behavior, measurements of subjective states (e.g., beliefs about teaching and learning or course satisfaction) are still primarily based on survey data. For example, learner intent or motivation (Koller et al., 2013; Reich, 2014; Kizilcec & Schneider, 2015) are considered to be one of the key pieces of information needed to understand retention and engagement in MOOCs. Both constructs are currently studied via web-based surveys of registered MOOC participants. The major challenge of using survey data to study MOOCs are very high unit non-response rates. Depending on whether the survey is conducted at the beginning or at the end of the course, response rates usually range between 5 and 20 percent. The latter is problematic, as survey methodologists warn about the influence of low response rates and nonresponse bias (see Groves & Peytcheva, 2008). While quality of learning analytics data receives extensive attention in the literature, the survey data in MOOCs are often taken at their face value.

The purpose of this paper is to examine the relationship between participation in a MOOC pre- and post-course evaluation survey and student engagement in the course. Given that topic salience is one of the most important predictors of survey participation (Adams & Umbach, 2012; Groves, Presser, & Dipko, 2004), we could hypothesize that respondents to the pre- or post-course survey are more interested in the course topic than nonrespondents. Although we do not have auxiliary data on students' interest, we can use activity logs as a proxy, as we know that interest and engagement are closely related (Järvelä & Renninger, 2014). Drawing on data from the first session of the Coursera MOOC Questionnaire Design for Social Surveys with 16 846 registered participants in summer 2014, we first compare survey response rate of students who engaged in at least one course activity and non-active students, that is, students who do not show any activity on the course platform after having registered for the course. Second, we compare survey

response rates across three identified clusters of active students with different engagement patterns.

Results demonstrate a vast difference in response rates between the pre- and post-course survey previously noted by other researchers (Kizilcec et al., 2013). 30 percent of all registered participants responded to the pre-course survey, compared to only five percent for the post-course survey. 66 percent of participants who responded to the pre-course survey started watching a video or submitted at least one assignment. Among the non-respondents, 60 percent disappeared from the course after having registered (i.e., non-active students). We find that response to a pre-course survey is a statistically significant predictor of engaging in at least one course activity after registration. For pre-course survey respondents, the odds of engaging at least in one course activity are 2.92 times higher than the odds for non-respondents ($p < 0.001$). By using k-means and k-medoids clustering techniques, we have found sub-populations similar to those identified by Kizilcec et al. (2013): persistent students (start to watch most of the course lectures and submit assignments throughout all course units); browsers (browse the course for a few units before disappearing); and auditors (engagement is limited to lecture videos). Examination of pre-course survey response rates across the identified clusters confirmed the relationship between survey participation and engagement. The response rate is associated with a statistically significant increase in the relative probability of being an auditor ($\text{Exp}(B) = 1.90$, $p < 0.001$) or browser ($\text{Exp}(B) = 2.65$, $p < 0.001$), but also with a much larger increase in the relative probability of being a persistent learner over being a non-active student ($\text{Exp}(B) = 6.67$, $p < 0.001$). Post-course survey responses are almost exclusively limited to persistent learners (response rates for not-active, browsers, auditors, and persistent students are 0.3, 0.8, 0.8, and 5 percent, respectively).

The findings suggest that for the given Coursera course the vast majority of our survey data (especially with regards to the post-course evaluation) stems from the most engaged students in MOOCs. In other words, our knowledge about the sub-groups who might need support the most is rather limited. In the discussion section, we address possible approaches to collect relevant data on less engaged learners, in order to understand their challenges. Another implication for future research is that the pre-course survey response rate could be potentially used as a proxy for learners' initial intent and motivation. Although there is an agreement about the importance of student intention and motivation for evaluation of MOOCs, the question on how to adequately measure these concepts is still unresolved. The survey literature clearly demonstrates the affect of topic interest on nonresponse, thus explaining the observed association between response rate and engagement. Since those who are more interested in the topic are more likely to be motivated and committed to finish the course at its start, the use of such a proxy is tenable. Although the results reflect patterns briefly reported by other researchers (Kizilcec et al. 2013; Reich, 2014), the current study is limited to data of a single Coursera

course with a specific topic (i.e., questionnaire development), hence the findings should be replicated in other courses on other topics.

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