

# How Students Engage with a Remedial English Writing MOOC

## A Case Study in Learning Analytics with Big Data

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- **Analysis of MOOC use data suggests better learning outcome measures than conventional pass/fail measures.**
  - **Student interactions with MOOC resources are a good predictor of achievement; self-reported student demographics are not.**
  - **Learner intent, as demonstrated by quiz/assignment attempts, is key to accurately assessing achievement.**
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Insufficient academic preparation is a major barrier to student success in higher education in the United States; one nationwide study found that 75% of students entering community colleges need remedial education in at least one subject to meet prerequisites for college credit courses.<sup>1</sup> The cost of preparing these students for college-level work is extremely high, both to the educational institutions delivering the instruction and to the students themselves, with \$4.6 billion in federal Pell grants going to students enrolled in at least one remedial course in 2011–12.<sup>2</sup> Further, a large percentage of students who require remedial education become mired in courses that are taught using the same deficit-based pedagogy that contributed to their failure to master the curriculum in high school.<sup>3</sup>

In 2011, declining state revenues in California and shrinking budgets for education prompted a review of massive open online courses (MOOCs) as a means to improve access to college. MOOCs capture detailed data about learner interactions with online course materials at a scale that supports research on detailed questions not feasible with other instructional modalities. MOOCs also promise to deliver education at scale using academic technologies and innovative (or at least newly popularized) pedagogical approaches.

Researchers and practitioners have found, however, that students who earn passing grades in MOOCs often have prior experience in higher education, including having completed degrees.<sup>4</sup> MOOCs are often designed for these students, who already possess the kinds of study skills and habits that many remedial students lack. Moreover, many MOOCs are not created for fundamental subjects but instead focus on advanced topics. Could a MOOC be designed to serve remedial students without strong study skills and habits? Crafting an Effective Writer: Tools for the Trade (CEW) was designed to create a noncredit option for remedial students to help build their skills before they enter college and thus reduce the remedial instruction needed.<sup>5</sup>

Faculty at Mt. San Jacinto College, a midsized California community college (approximately 10,000 FTEs), had been successfully teaching fully online courses for over a decade, and CEW was designed in the style of the college's for-credit distance education courses. For example, introducing students to

the course is a readiness module that involves students in activities designed to prepare them to be successful in the course. The course is divided into five modules that are organized in a consistent and logical way, and the structure encourages interaction between the students and the teachers throughout the course. Three English writing teachers designed the course content in collaboration with instructional designers.

The course has now been offered six times, enrolling over 250,000 learners. This study investigated the second offering of the course, which began in September 2013 and had a total enrollment of 48,174 learners from countries around the globe. Data analyzed for this study included MOOC interaction data (n = 34,952), the online learning readiness quiz (n = 10,458), entry surveys (n = 12,252), exit surveys (n = 1,627), and course forum posts.

The following questions guided the study:

- Can students be grouped into a meaningful typology of participation?
- Do early participation activities, such as participation in discussion forums, completion of videos, and submission of assignments, predict final levels of participation and learning outcomes?
- What demographic characteristics, motivations for enrollment, and other self-reported student data would help MOOC providers and course instructors identify and support students most at risk of low participation in remedial courses?
- What did students say helped them succeed, and what challenges did they encounter, as indicated by surveys before and after the course and by discussion forums?

## Study Findings

Ultimately, the study revealed higher levels of meaningful activity in the MOOC than was indicated by traditional pass or completion metrics. Entry survey results represented a diverse population of learners taking the course. The act of taking surveys had a significant positive relationship with participation, suggesting there may be underlying motivations—not captured in traditional survey questions—that shed light on why individuals engage in these courses.

### **Finding 1: Clustered participation levels are more meaningful and demonstrate higher levels of value for MOOC learners than typical completion and activity measures.**

Building on the clustering methodology developed by Kizilcec, Piech, and Schneider,<sup>6</sup> this study found that 23% of the learners experienced sustained interactions with the course, suggesting that they received benefits from the course. This figure is in stark contrast to the 8% course pass rate, which is the typical measure used to assess student achievement.

MOOC interactions were filtered by activities that had potentially high learning value: watching core instructional videos, completing weekly quizzes, completing weekly assignments, and participating in the discussion forum. These activities were then grouped into five activity levels:

1. No Activity
2. Sampling (participate in any activity)
3. Auditing (access two of three core lectures)
4. On Track (access lectures, complete assignment)
5. On Track+Forum (complete other activities and participate in discussion forum)

An activity level was assigned for each week, and K-means cluster analysis identified patterns across learners by weekly participation levels, which led to four categories:

- Disengaged
- Declining
- Lurking
- Persisting

Figure 1 illustrates the clusters, showing the categories by activity level and week. Each small dot represents a single learner; dense circles indicate a large number of students at that week/activity level. Students in the bottom two clusters (Lurking and Persisting) had ongoing substantive participation in the course, even though they may not have reached the 80% point threshold required to complete the course. These learners represented 23% (11,438) of the registered students, which is a three-fold increase in meaningful MOOC use compared to the typical “course pass” metric (8% passed, 3,753 learners). In addition to indicating greater participation, clustering activity levels provides a more detailed account of how students engage in the course, and that information can be used to better understand both learning outcomes and processes.

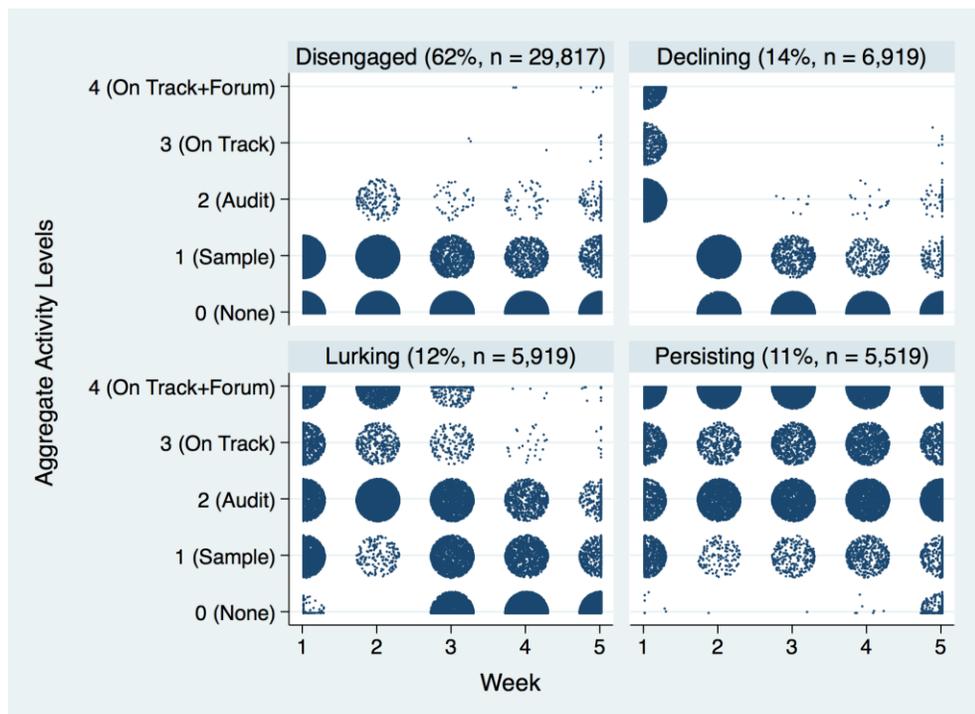


Figure 1. K-means clustered activity levels

The participation clusters led us to reconsider our initial research question seeking predictors that could be used to increase participation for all learners in the course. Disengaged learners, representing the majority of all registrations (62%), never substantially engaged with the course. From an empirical perspective, their low participation level could not be due to MOOC design because they did not access the course enough to be influenced by the content. Increasing the participation of these learners would involve factors and interventions outside the control of MOOC researchers and designers (e.g., time, interest, commitment, access).

In contrast, declining learners (14%) began with high levels of participation but stopped participating by week two. Focused interventions on this subpopulation could be effective because these students demonstrated the potential for higher levels of participation. This is a group that merits further research and investigation to increase MOOC learning impact.

## Finding 2: Entry survey responses were not significantly related to participation levels.

One of the most surprising findings in this study was what we didn't find. Specifically, learners' self-reported motivations for taking the course, amount of time they intended to spend on the course, and demographic criteria were not significantly related to course participation. This outcome is contradictory to commonsense ideas about MOOC participation as a function of learner goals and prior educational experience.

The entry survey asked questions related to student demographic background (age, race/ethnicity, gender, professional status, educational background), intentions for taking the course (time dedicated, participation/completion goal), and motivation for taking the course. None of the survey responses had a statistically significant relationship with the overall course participation level. Not only did students' background and professional status have no relationship to their level of engagement, their stated intent about completing the course was not related to their level of participation. This finding contrasts with another recent study that found that MOOCs primarily serve highly educated learners.<sup>7</sup> The differing results for this course could be due to the subject matter (as a beginner course), the use of participation levels as the dependent variable, or an unexplored factor.

## Finding 3: The best predictor of participation is initial interaction with "opt in" activities such as surveys or readiness self-tests.

These interactions demonstrate a higher degree of ongoing interest and learning in the course. The act of taking the entry survey or participating in the online learning readiness quiz were both significantly related to participation ( $p < .001$ ). The online learning readiness quiz is an ungraded self-assessment intended to help learners identify skills and behaviors they need to be successful in the course. Taking this quiz explained 15% of the variation in participation levels. As illustrated in figure 2, although there was little difference in the Persisting group between students who passed the quiz (42%) and those who did not (36%), the gap between students who took the quiz at all and those who did not (4%) was considerable. Statistical testing found that there was not a significant relationship between passing the online readiness quiz and participation levels.

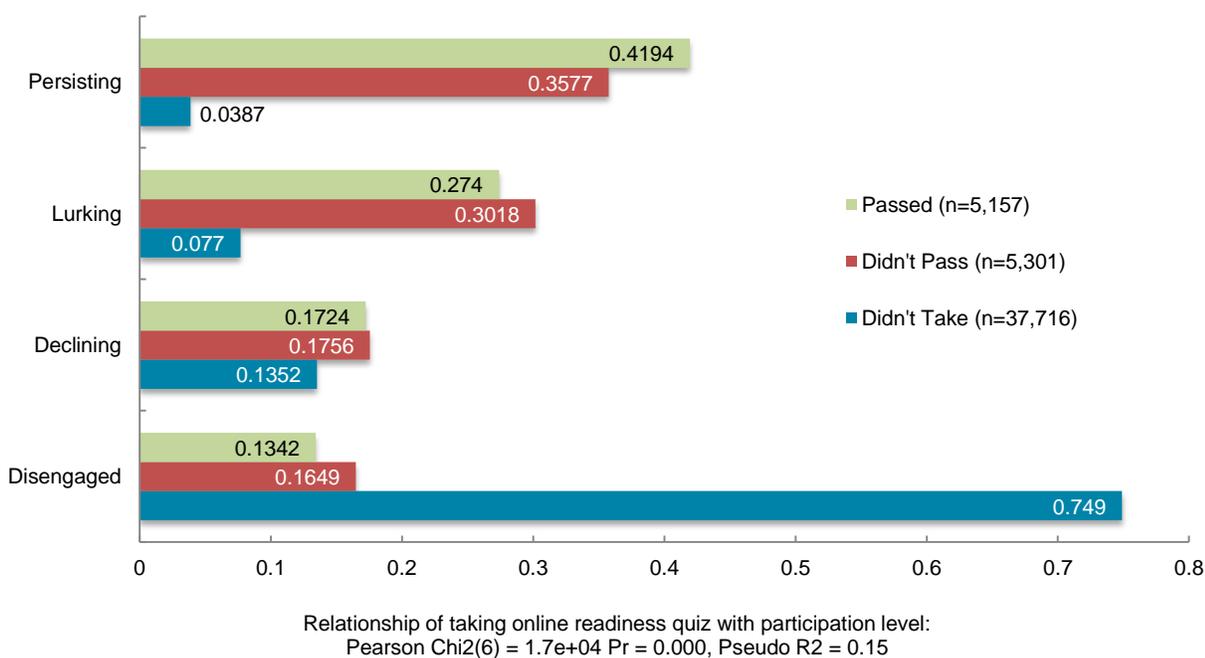


Figure 2. Online learning readiness quiz versus participation levels

#### Finding 4: Learners attempt quizzes when they've mastered the material.

The total score on all graded items is low but masks an interesting trend: When the score is calculated as a function of items attempted, the grade distribution is skewed toward high scores, as indicated in figure 3. The average grade increases with the more items attempted by the learner. This finding is not surprising from a theoretical perspective (and indeed is a bias factor known as the “survival effect” in educational research), but suggests that attempts to take assessments are also indicators of learning outcomes.

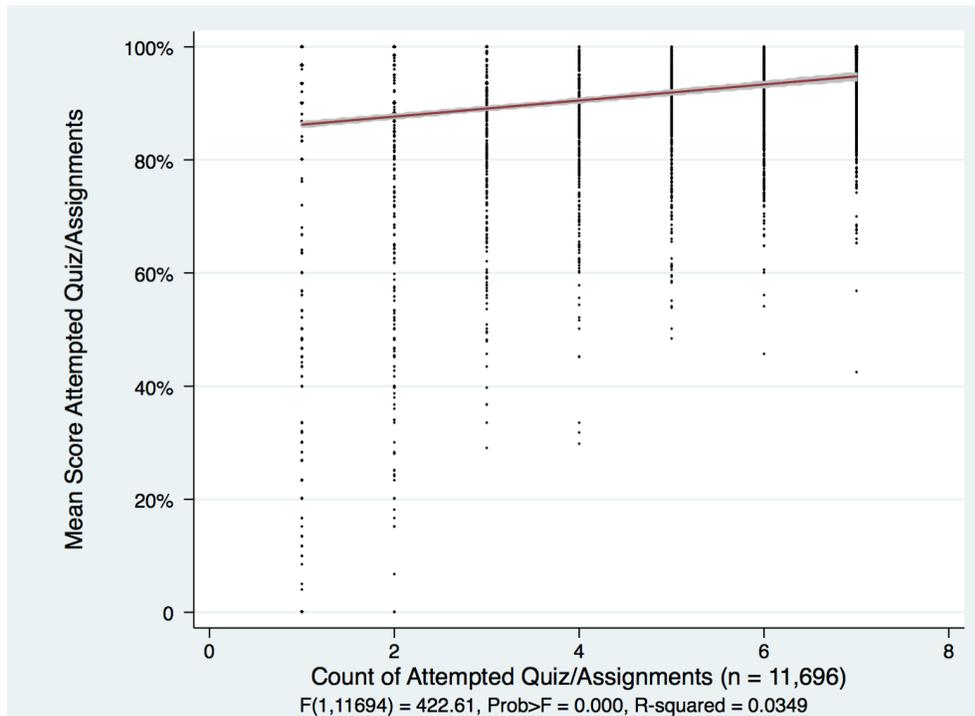


Figure 3. Mean score versus items attempted

## Conclusions

Based on this research, we discovered that this MOOC did provide a meaningful educational experience to increase English competency for a large aggregate number and proportion of total registrants in CEW. The findings suggest that when the materials were accessed and used, the learners achieved significant benefits, based on the assessment results. Clustered participation levels reveal ongoing engagement above what is indicated by conventional course pass rates. Discovering that student entry survey responses were not significantly related to participation level was surprising and possibly indicates a difference between this course and other MOOCs. The significance of survey and quiz-taking behavior suggests that MOOC interaction data may reveal additional motivations (or barriers) that underlie learner participation that should be investigated with further research.<sup>8</sup>

## Notes

1. National Center for Public Policy and Higher Education and Southern Regional Education Board, “[Beyond the Rhetoric: Improving College Readiness through Coherent State Policy](#),” June 2010.
2. Josh Mitchell, “[Remedial Courses in College Stir Questions Over Cost, Effectiveness](#),” *Wall Street Journal*, November 17, 2014.

3. W. Norton Grubb et al., "[Understanding the 'Crisis' in Basic Skills: Framing the Issues in Community Colleges](#)," working paper (Berkeley: Policy Analysis for California Education, 2011).
4. Lori Breslow, David E. Pritchard, Jennifer DeBoer, Glenda S. Stump, Andrew D. Ho, and Daniel T. Seaton, "[Studying Learning in the Worldwide Classroom: Research into edX's First MOOC](#)," *Research & Practice in Assessment* 8 (Summer 2013): 13–25.
5. This research was supported by Athabasca University and the Bill & Melinda Gates Foundation through a MOOC Research Initiative grant.
6. René F. Kizilcec, Chris Piech, and Emily Schneider, "[Deconstructing Disengagement: Analyzing Learner Subpopulations in Massive Open Online Courses](#)," paper presented at the Third Conference on Learning Analytics and Knowledge, Leuven, Belgium, April 8–12, 2103.
7. Katy Jordan, "[MOOC Completion Rates: The Data](#)," accessed on June 1, 2013.
8. The National Repository for Online Courses (NROC) "HippoCampus" effort implemented course lectures into its library of freely accessible writing resources for students. The NROC materials can be found at <http://bit.ly/CEWvideos>. The [course](#) is still being offered through Coursera.