

ANALYSIS OF ADULT LEARNER SENSE OF COMMUNITY IN ONLINE CLASSES

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ABSTRACT

Social presence is fundamental to social constructivism and maximizing fruitful learning experiences, so distance education course designers make efforts to create technological avenues for learner creation of an online social presence. How is learner sense of social presence impacted by platform features such as course pacing, and how do on-demand versus session-based versions of the same online course differ in the degrees that learners effectively establish social presence? To probe this research question, multi-item construct scales for learner social presence, sense of community, and course satisfaction were deployed in post-course surveys for online chemistry or statistics courses in self-paced versus session-based formats. In session-based massive open online courses (MOOCs), learner sense of community was found to correlate positively with posting on the course forum, an optional aspect of the courses, and this result was statistically significant. Difficulties in providing functional pathways for learner creation of social presence and development of sense of community in self-paced, “on demand” course formats, as well as implications for future course design and research, will be discussed. These results especially impact learning of adults (age 26+) in college-level courses: because of family and work demands, adults are over-represented in part-time, evening, weekend, and online programs rather than traditional 4-year full-time programs, and their needs often drive the development of on-demand course platforms.

KEYWORDS: Adult learning, lifelong learning, online learning, post-secondary education, sense of community, teaching/learning strategies

INTRODUCTION

Massive Open Online Courses (MOOCs) have prompted challenging questions about how diverse populations of learners can successfully master topics on free websites rather than through tuition-based courses online or at brick-and-mortar universities. Researchers in distance learning have long challenged the myth that a strong sense of learning community *only* occurs in traditional classroom settings (Rovai, 2002c). But, asynchronous learner participation and the use of technology still can present barriers that must be considered in course design (Liu et al., 2007). Early critics of MOOCs pointed to low persistence rates and hailed the interpersonal interactions of traditional classroom environments (Kolowich, 2011; Kim, 2012; Pienta, 2013). While classroom activities that facilitate interpersonal interaction are indeed the ideal learning situation for many (but not all) students (Barger et al., 2018), it would be wise to acknowledge that many face-to-face courses, such



large science lectures, for example, still lack significant levels of peer engagement during class time, causing peer-to-peer interaction to remain a neglected variable in education (Johnson, 1981). An interesting facet of the MOOC movement is the enhanced access to college-level learning opportunities that it affords to working adults. Large demographic studies of hundreds of courses and millions of participants have identified a mean MOOC learner age of 29 years old (Chuang, Ho, 2017).

At the same time, learning of adults in college-level courses is not widely studied even though the overall percentage of adult learners in higher education is on the rise (Ross-Gordon, 2011). Because of family and work demands, these learners are over-represented in part-time, evening, and weekend programs rather than traditional 4-year, full-time programs (Munro, 2011). They also constitute an increasing majority of students in online distance education (Ke, Xie, 2009). Nonetheless, distinct patterns of barriers to full education and educational support service use have been reported for these “mature-aged” students, and those barriers are exacerbated for students from low socioeconomic backgrounds (Tones et al., 2009). A recent analysis of 28 online courses revealed some differences in participation, perceptions, and learning satisfaction across varied age and ethnicity groups (Ke, Kwak, 2013). Our study aims to build upon this work in the open and free MOOC learning space, which provides an opportunity to delve into understanding learning and behaviors of understudied groups by allowing extremely large numbers of learners from diverse backgrounds to work through the same curriculum and be evaluated using the same criteria.

We are particularly concerned about math and science education (our areas of expertise.) Both fields experience high rates of loss of student interest during the first year of college-level study (Daempfle, 2004), sometimes because students feel “overwhelmed by the pace and load of curriculum demands” (Seymour, 1995, p.199). This phenomenon is magnified for less experienced students who come from disadvantaged socioeconomic backgrounds or who return to the classroom after a prolonged period in the workforce. Indeed, there is a substantial area of intersection of these groups with the MOOC learner population. Rather than subscribe to the “student deficit” model of thinking, we prefer to view brick-and-mortar colleges and universities as often *underprepared institutions* (Canelas, 2015; Smit, 2012) for dealing with both these groups students and the recent trend toward massification of higher learning. Online platforms and resources have recently been shown to have utility for both chemistry (Shapiro et al., 2017; Sørensen, Canelas, 2017) and statistics (Dunn, 2014; Shapiro et al., 2017) learning.

Our central research questions are: How, and to what extent, do adult and less well-prepared learners gain satisfaction through participation in MOOCs, and how do all learners use non-continuous communication such as course wikis or discussion forums to create a social presence and sense of community? One of our primary aims is to explore how adult (between the ages of 18 and 64) learners engage with the MOOC platforms and course materials – how they interact with the online resources and their “classmates,” what their learning goals are and how well they achieve them, their satisfaction with the courses, etc.

THEORETICAL FRAMEWORK

This work is grounded in social presence theory, which is part of the community of inquiry framework (Garrison, Anderson, Archer, 2000; Shea, Bidjerano, 2009). In a study of 2159 online learners, Shea and Bidjerano (p. 543) used structural equation modeling to support their claim that “70% of the variance in the online student’s levels of cognitive presence, a multivariate measure of learning, can be modeled based on their reports of their instructors’ skills in fostering teaching presence and their own abilities to establish a sense of social presence”. Swan notes that “social presence derives from both the affective communication channels available in a medium and the immediacy behaviors of the participating communicators” (Swan, 2002, p. 42). Social presence has been investigated as a component of the SIPS (*Sociability, Social Interaction, Social Presence, Social Space*) model in an online context (Weidlich, Bastiaens, 2017). The community of inquiry framework has recently been shown to be reliable and valid in MOOC contexts (Kovanovi et al., 2018).

This framework builds upon the work of Rovai and colleagues, who note that the “literature identifies feelings of alienation and low sense of community as factors that help explain relatively low student persistence rates in distance education programs” (Rovai, Wighting, 2005). Brown used a grounded theory approach to propose the process by which an online learning community become established (Brown, 2001). The link between this process and course completion rates has been suggested: “Online learners who have stronger sense of community and perceive greater cognitive learning should feel less isolated and have greater satisfaction with their academic programs, possibly resulting in fewer dropouts” (Rovai, 2002b, p. 319).

METHODS

Courses. Survey participants were enrolled in at least one of three session-based Coursera courses in chemistry (1 course) or statistics (2 courses). These courses in their session-based formats have been previously described (Shapiro et al., 2017). Courses were deployed in two formats:

1. *session-based*, meaning the participants were working on the same unit of material at approximately the same time, with assignments due in weekly increments, and
2. *on demand*, meaning that participants could join the course at any time and work through the units at their own pace so that learners are all at slightly different locations in their progress through the units at any given point in time

The session-based format courses were offered 1-3 times per year from January, 2014 through summer, 2016. During this time, the chemistry courses was divided into two shorter courses that together contained all of the units present in the original course, while the statistics courses were split into five units which comprise what is now the “Statistics with R” specialization. In the summer of 2016, Coursera forced transition of all courses to their *on demand* platform, and these courses have run continuously (365 days a year) in that format since that summer.



All courses in both formats contained communication forums where learners could start threads to freely post and reply to posts by others. These had sub forums organized by week and other logical topics. More information about the organization of the chemistry course forum, including analysis of learner writing on the forum for one of the sessions, has been previously published (Comer, Clark, Canelas, 2014).

Description of Sample. For the session-based courses, 2406 participants completed some portion of the post course survey; participants had the option to skip any item on the survey. The dataset was de-identified to remove participant names and other identifying information (such as email and IP addresses); in place of those items, each participant was assigned a unique identifier number. Of that original pool of respondents, 1097 reported their age. Twenty-seven of these respondents were under the age of 18 and forty-six reported that they were aged 65 or older. Because our investigation was designed to investigate the role of use of online learning with typical adult learners, these 73 were excluded from our sample, leaving us with a sample size of 1024. In terms of distribution between the courses, 742 of these respondents were enrolled in one of the statistics MOOCs, while 248 were enrolled in chemistry. For the on demand courses, post course survey return rates were dismally low: only 40 learner surveys were returned over a time period that mirrored that for the session-based courses. Due to very large selection bias inherent in such a low return rate, these survey responses were not further analyzed.

Survey instruments. Participants were asked to give their informed consent as part of a pre-course baseline survey about prior knowledge, goals, intent, and demographics at the beginning of courses. At the conclusion of the courses, learners were invited to complete a post course survey. This survey was designed to confirm previously collected demographic data, ask about use levels and opinions regarding various course features and resources, and to assess students' sense of community in the courses. As part of the standard institutional post-course survey, respondents were asked to report to what extent they participated in the following non-required components of the course: participate in a discussion forum, joined a Google Hangout with other students, was active in a study group, viewed the course wiki, and contributed to the course wiki. Frequency of participation in each of these components was assessed along a 3-point scale with response options anchored by 1 = not at all, 2 = occasionally, and 3 = frequently.

Because a criticism of asynchronous MOOCs has been that learners in these courses are unable to create a sense of community, we need to examine whether learners in the course did experience social presence and sense of community. In order to assess this, we embedded two questionnaires in the post course survey. A third, 17-item questionnaire was also used. However, only 259 respondents completed it. So, our analyses will use the 11- and 13-item scales. Internal consistency for this scale was high, $\alpha = .86$. Each questionnaire was comprised of items from the Classroom Community Scale (Rovai, 2002a) or the Social Presence Scale (Kim, 2011). The first scale was an 11-item scale with response items varying along a 5 point, Likert-type scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Items were scored so that higher scores indicated greater levels of perceived community. Example items for this scale include, "I feel that I can rely on others in the course" and "I was able to be personally close to other participants in the class".

The other scale analyzed herein was a 13-item scale with response items varying along a Likert-type scale with the same anchors. Example items include, “I feel connected to others in this course” and “I called the other participants by their names”.

Statistical Methods. The dataset was analyzed using the SPSS statistics software platform. Internal consistency for each scale was measured by Cronbach’s alpha (), which is calculated by a pair-wise correlation between items. In general, an ≥ 0.70 result indicates sufficient reliability (Cortina, 1993); reliability scores below 0.70 may also be acceptable in some circumstances (Schmitt, 1996). We used confirmatory factor analysis (CFA) to validate the factor structure of the measures. Composite mean values (M), Median values (Mdn) and standard deviations (SD) for each scale were computed. Multivariable linear regression analyses (ANOVA’s) were completed. Mann-Whitney tests were used to determine if the participant responses differed depending upon the course domain (chemistry or statistics.)

RESULTS AND DISCUSSION

Consistent with the previously reported trend in MOOC participant ages (Chuang and Ho, 2017), most of the learners in these courses were older than traditional college age. Of the 1024 participants whose responses were analyzed, 118 were between the ages of 18-25, 330 were between the ages of 26-34, and 576 between ages 35-64. Nearly all of the respondents also reported their gender: 634 participants self-identified as “male”, 384 as “female”, and 1 as “other”. Figure 1 displays age group by gender frequencies.

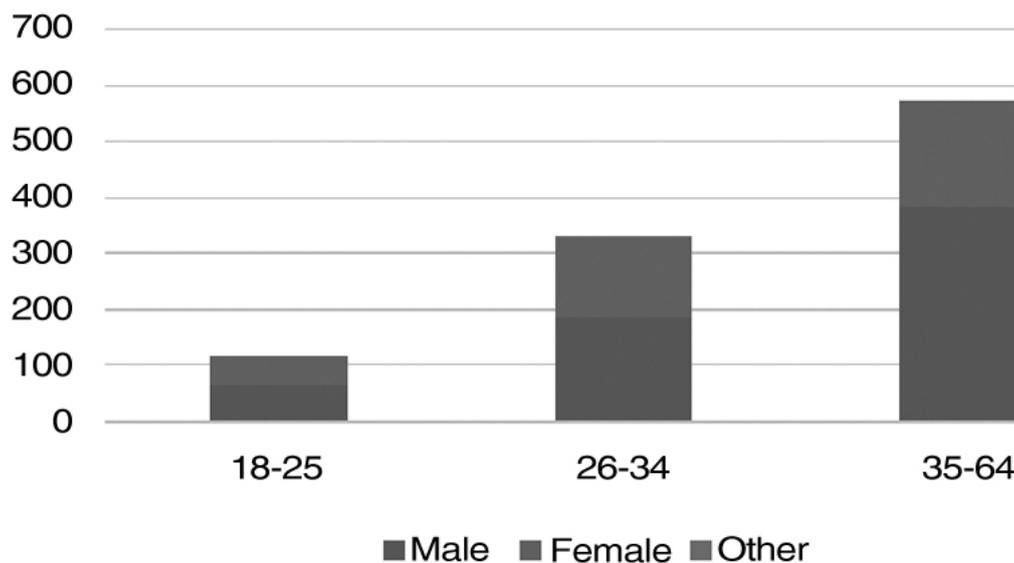


Figure 1. Self-reported gender by age group



Over sixty percent of the sample who answered the question about language literacy, or 614 of the 1,018 respondents for this item, indicated that English was *not* their first language. The sample population was international: 1021 respondents reported that they resided in 85 different countries. Figure 2 displays student frequencies by country with select numerical values provided on the larger land areas. Over 65% of these respondents reported residing in countries outside of the United States. Thirty-two percent of these students living outside of the US lived in countries with fewer than 10 respondents. Respondents from India accounted for 8% of students outside of the US. Students from the United Kingdom represented 7% of these respondents.

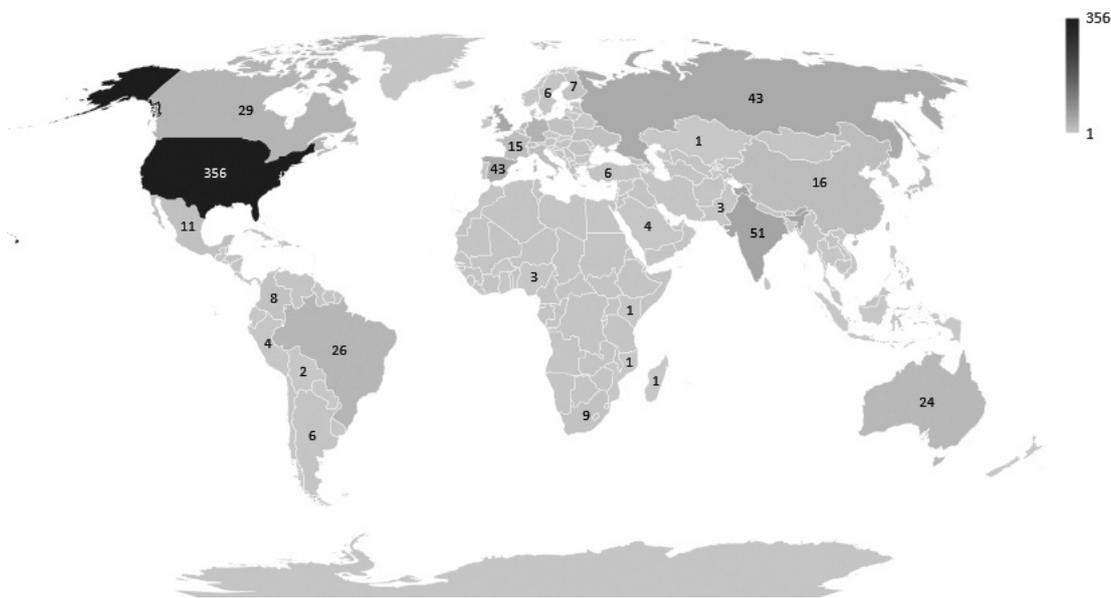


Figure 2. Survey respondents' self-reported locations

Almost all of the survey respondents ($N = 1022$) indicated their level of completed education. Educational attainment for the sample was quite high, with over 90% of respondents reporting that they had earned at least a “Bachelor’s Degree or Equivalent.” Figure 3 displays respondents’ self-reported level of education. The relatively highly-educated nature of the MOOC participants in this study is consistent with prior findings (Emanuel, 2013).

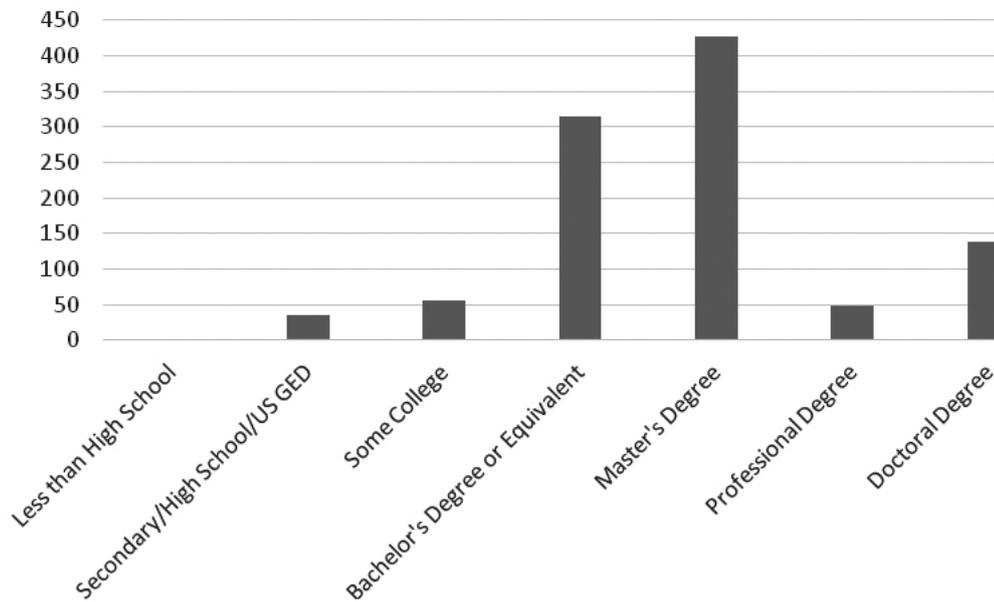


Figure 3. Survey respondents' self-reported levels of educational attainment

Of the 1119 respondents who reported their previous experience with the course topic, over 50% indicated that they had completed some coursework or have some work experience in the field. Twenty percent, however, indicated that they were mostly new to the subject.

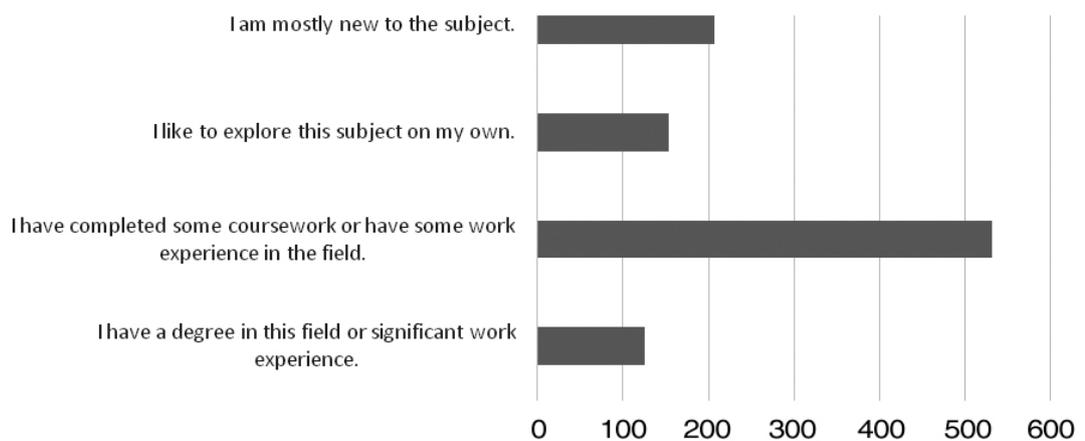


Figure 4. Survey respondents' self-reported previous experience with the course topic



CAN LEARNERS CREATE SOCIAL PRESENCE AND SENSE OF COMMUNITY IN MOOCs?

Of the five non-mandatory sense of community building course components, two were the most popular: participation in discussion forums and viewing the course wiki. Five percent or fewer of all respondents reported that they joined a Google Hangout with peers, participated in a study group, or contributed to the course wiki either occasionally or frequently. Figures 5 and 6 present self-reported amount of participation in discussion forums and viewing of the course wiki.

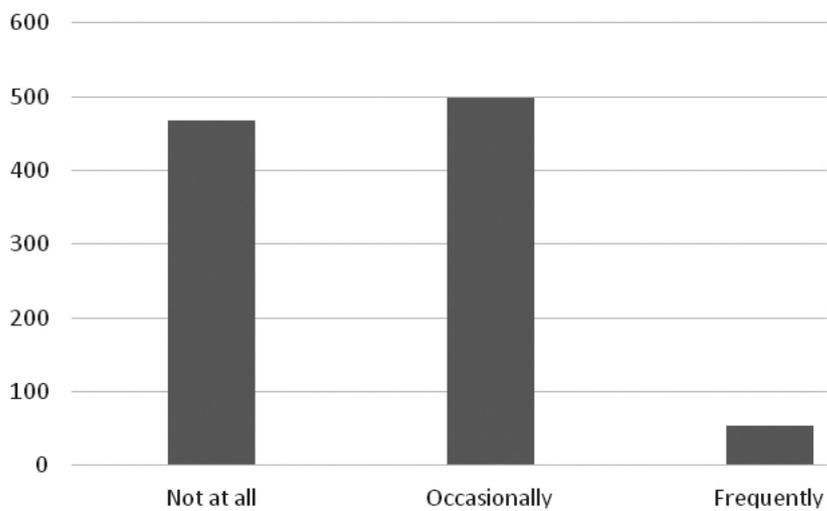


Figure 5. Survey respondents' self-reported frequency of participation in discussion forums

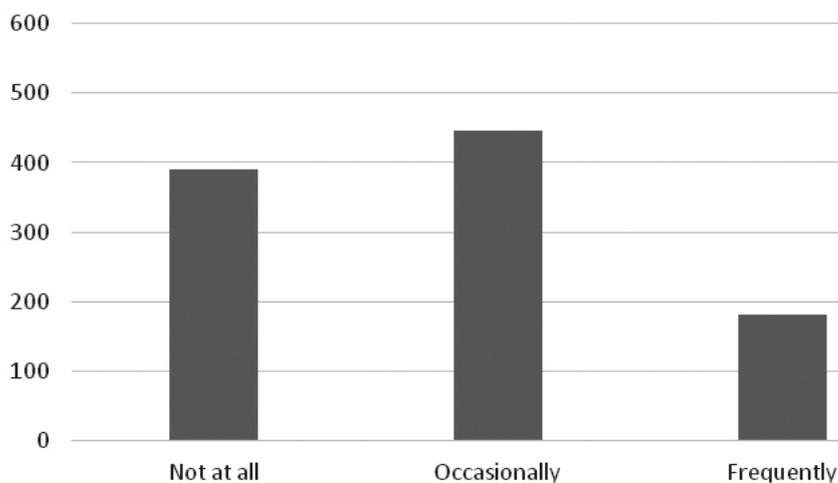


Figure 6. Survey respondents' self-reported frequency of viewing of course wiki

Students who reported that they participated in discussion forums frequently, and those who viewed the course wiki frequently, reported the highest levels of community on both sense of community scales. Though the correlation between reported use of these two components was positive and significant, they are only modestly associated ($r = 0.16$, $p < 0.01$). So, sense of community may also be fostered in MOOCs in a more passive way.

How and to what extent do adult, less domain-experienced learners gain satisfaction with their participation in MOOCs?

Because one of the two central aims of our investigation is to examine how less well prepared adult learners gain satisfaction through participation in MOOCs, we will identify less well-prepared learners in our investigation as students who reported that they are mostly new to the subject. This group of learners has the lowest level of educational attainment and spent the longest amount of time studying for the course; details follow.

One thousand and eight respondents reported how many hours they invested each week in the course. On average, these respondents spent 7.3 hours on the course per week ($SD = 4.30$).

A Mann-Whitney test indicated that respondents in the chemistry course reported more time on coursework ($Mdn = 7$) than did respondents in the statistics course ($Mdn = 6$), $U = 92225.50$, $p = 0.03$. Course (Statistics or Chemistry) did not interact with previous experience with course topic, however, ($F(3, 996) = 0.45$, $p = 0.72$).

Self-reported hours spent on course material ranged from 0.75 hours to 30 hours per week. Analysis of variance (ANOVA) results indicated a main effect for previous experience with the course topic on amount of time spent on course work during the week ($F(3, 1000) = 12.097$, $p < 0.01$). Post hoc tests for differences between group means using the Games-Howell test designed for unequal sample sizes and variances indicated that students who reported that they were mostly new to the subject reported spending significantly more time on course-related work ($M = 8.88$, $SD = 5.12$) than those who were exploring the subject on their own ($M = 7.11$, $SD = 3.98$, $p = 0.002$), had completed some coursework or have experience in the field ($M = 7.02$, $SD = 3.91$, $p < 0.001$), or have a degree in the field or significant work experience ($M = 6.40$, $SD = 4.23$, $p < 0.001$).

Not surprisingly, respondents who were mostly new to the field also reported the lowest mean level of education reported ($M = 4.40$, $SD = 1.19$). ANOVA results indicated a significant difference between respondents with different levels of experience with the course topic ($F(3, 1013) = 14.61$, $p < 0.01$). Games-Howell post hoc tests revealed that these learners reported lower educational attainment than their peers who have a degree or significant work experience ($M = 5.13$, $SD = 1.08$, $p < 0.01$) and those who have completed some coursework or have some work experience in the field ($M = 4.91$, $SD = 1.14$, $p < 0.01$). New to the field respondents did not significantly differ in level of educational attainment from those who were exploring the subject on their own, however ($M = 4.60$, $SD = 1.23$, $p = 0.45$).

Sense of Community in the Courses. For the combined dataset for three courses analyzed herein, internal consistency for the 11-item scale was satisfactory: $\alpha = 0.76$. Internal consistency for the 13-item scale was also high, $\alpha = 0.84$. Mean levels of self-reported community were over the mid-point for both scales. For the 11-item scale, $M = 3.40$ and $SD = 0.47$. For the other scale,



$M = 3.32$, $SD = 0.46$. Mann-Whitney tests indicated that participants' distributions of responses did not depend upon the subject matter of the course (chemistry or statistics) on either sense of community scale. For the first questionnaire, participants from chemistry course ($Mdn = 3.38$) did not report a different level of course community than did respondents in the statistics courses ($Mdn = 3.31$), $U = 96201.50$, $p = 0.58$. For the second questionnaire, participants from chemistry course ($Mdn = 3.27$) did not report a different level of course community than did respondents in the statistics courses ($Mdn = 3.27$), $U = 95208.50$, $p = 0.77$. So, learners were able to successfully create a sense of community in both types of the courses.

Guidelines have been suggested for development of community on online courses (Yuan, Kim, 2014), and some of these elements were present in the courses. These elements are: 1) employing strategies to stimulation discussion, 2) encouraging both task-oriented and purely social discussions, and 3) assigning tasks that require collaboration (Yuan, Kim, 2014). In our courses, discussion was easily stimulated in the session-based format as almost all students in the session based format were working on the same topic in the same week. Although courses were asynchronous in that there was not set class meeting time, there was synchronicity of learners on a weekly basis due to the common topic at hand. Instructors sent weekly email announcements reminded students about the next topic and upcoming due dates. Hundreds to thousands of students simultaneously working over the same material each week over a period of many weeks resulted in robust traffic of new thread creation and responses to queries existing. For example, in the first eight weeks of the first session based deployment of the chemistry course, 1645 unique participants created at least one forum post, creating 1874 threads and 7198 total posts (Comer, Clark, Canelas, 2014). Instructors were able to encourage social discussion by creating threads such as "Introduce yourself", and task-oriented threads emerged naturally as learners posted their questions and found peers ready to answer or engage in additional questions. The forums were wiped clean at the end of each session, so that learners in the next session did not have a way to read questions and answers from previous cohorts; instead, they had to generate their own questions and answers as a group. Finally, in the session-based course, the instructors assigned tasks that required collaboration, such as a peer reviewed writing assignment for those interested in earning a certification of completion with distinction. Because thousands of learners were working on the essay one week and then reviewing peer essays in concert the following week, this worked well. Indeed, cohort formation is important for building trust, and peer-review can work well online under the appropriate conditions (Comer, 2013).

In contrast, the on demand platform has led to very little instructor-to-student and peer-to-peer engagement. Instructors can no longer send particularly meaningful emails about the weekly topics and due dates since students are working at their own pace, hard due dates no longer exist, and learners may be at any point in the course material. The course discussion forums are still present, but active learner traffic on these has basically shut down due to learner disuse in the on demand format. As an illustration, since the on demand format launched on August 21, 2016, only 88 total threads on the discussion forum have been created by learners in the chemistry courses.

This conference presentation is comprised of on-going, previously unpublished work. For our future work, we are continuing to collect data in the on demand offerings of the courses to see if we can obtain a large enough sample of surveys to conduct a meaningful analysis. We are continuing our current analysis to examine whether or not there are gender or age effects on

sense of community as these have been explored in the literature. For example, Shea noted that “gender also appears to play a small role in students’ sense of learning community with female students reporting higher levels than their male classmates” (Shea, 2006, p. 35) and that “alternative hypotheses regarding student demographics associated with variables such as age (the “net generation” effect) and gender are also examined no significant effects were found by demographic differences examined” (Shea et al., 2006, p. 175).

CONCLUSIONS

We have identified a significant theme around forum use that shows the importance of and impact of the learner social presence and sense of community in MOOCs. Higher participant forum rating (more forum use) is positively and significantly associated with satisfaction with the course and the sense of community scales for the session-based courses. Therefore, we suggest that course designers should provide a well-organized participant communication forum, perhaps with separate sections for each assignment or unit, and participants should be encouraged to seek out the forums on a regular basis (perhaps via weekly announcement or emails.) Overall satisfaction with the courses are positively and significantly associated with sense of community. Less experienced students report spending more time on their coursework, participate more in the forums, and report greater sense of community. Extremely low post-course survey return rates in “on demand” format courses, coupled with drastically slower traffic on the discussion forums, leads us to the conclusion that on demand formats for online courses are counterproductive in generating learner sense of community and learner social presence.

LIMITATIONS

A primary limitation is that not all course enrollees participated by completing the surveys, so any analysis of survey data will have selection bias and only include data from those students who felt motivated to submit the surveys. This was especially problematic since the transition to the on demand platform; although learners continued to complete the course, the post-course survey return rate became so low that we cannot analyze the data to draw any conclusions in good faith. There is an additional selection bias due to the fact that students with relatively higher proficiency in English might be more likely to complete the surveys.

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