

Original Paper

Large Discussion Groups' Impact on Engagement and Community

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Received: January 14, 2024 Accepted: January 24, 2024 Online Published: February 5, 2024

doi:10.22158/fce.v5n1p1

URL: <http://dx.doi.org/10.22158/fce.v5n1p1>

Abstract

To address the solitary nature of online learning, asynchronous micro discussion tools can be implemented to enrich students' learning experiences by encouraging interaction among students, nurturing social presence, and facilitating community development. Students' experiences using an asynchronous micro discussion tool in online learning were investigated, with a focus on engagement in learning with peers, sense of community, and technology's effectiveness. Survey data was analyzed from two sections of an online introductory course from 458 postsecondary university students. As part of the course evaluation, students were asked to participate in three, intentionally designed discussions using an asynchronous micro discussion tool. In each instance, the discussion topic was tightly linked to course content, promoting collaborative, reflective learning. Results indicated that while students felt that learning through asynchronous micro discussions was effective, they did not feel a strong sense of community using this method. However, students who experienced increased engagement also reported having a better understanding of the course material, fewer technological issues, and felt a stronger peer-to-peer connection. Importantly, collaborative learning that increases engagement does not appear to be negatively influenced by large group size in higher education. Given the prevalence of the online learning environment this is valuable course design information.

Keywords

online learning, asynchronous micro discussion, engagement, community

1. Introduction

As the use of technology in post-secondary education for learning evolves, so too does the popularity of online learning (Chen et al., 2018; Jan & Vlachopoulos, 2018; Wang, 2019). While many students are opting to take online courses out of convenience, more courses are routinely offered exclusively online in response to market demands (Jan & Vlachopoulos, 2018; Osborne et al., 2018). Notably, COVID-19 has dramatically altered learning environments, further elevating online learning as a common course delivery method (Lockee, 2021). One residual outcome is high enrollment online courses. Careful consideration of the pedagogical challenges of these high enrollment courses which, ultimately impacts student learning is needed. One such challenge is determining the best size of asynchronous discussion groups in high enrolment higher education courses which foster community, engagement and student learning. The literature points to contrasting views on the optional size of discussion groups. For some, small groups benefited from high instructor involvement, guided discussions, (Chen et al., 2018; Peddibholta & Jani, 2019). In large group discussions, the presence of the instructor with structured discussions tended to stymie participation (Chen et al., 2018). Increased social presence, connection, feelings of community and engagement were found in smaller sized groups (Akcaoglu & Lee, 2016; Qui & McDougall, 2015). With a moderate group size of 30 and 38, respectively, Chen and Liu's (2020) and Lou et al.'s (2023) works revealed similar results. Many online courses have higher enrolment rates of 60+ students. Little research investigating the impact of large groups on student learning, engagement and community have been reported. This is an area our current work explored, with class sizes of 80 divided into groups of 80, 40 and 20 students.

Online learning offers many benefits to students. These range from flexibility of location and time, scheduling ease, access to courses at other institutions, an opportunity to review and reflect on discussion content, positive educational experiences, and overall strong assessment results and achievement (Alzahrani, 2017; Delahunty, 2018; Koszalka et al., 2021; Massey et al., 2019; Niinivaara & Vaattovaara, 2018; Ronto et al., 2021; Wang, 2019). Facilitators should work toward establishing a collaborative learning space wherein frequent interaction, meaningful discussion and interactions among the group, and enforcement of guidelines such as respectful conduct (Osborne et al., 2018) exist to promote a healthy online community that fosters student learning and success. Saraja et al. (2018) recommend having a clear understanding of the interface and course structure. The intentional design of this collaborative learning space, routed in social constructivism Vygotsky (1968, 1978), supports knowledge development of all users through socially meaningful interactions. Additionally, Akpan, Igwe, Mpamah and Okoro (2020) suggest that this socially constructivist collaborative learning include opportunities for discussion and sharing among students.

2. Literature Review

Careful pedagogical design considerations are needed to deliver a meaningfully successful online learning experience. Three such considerations include providing and supporting a sense of community; opportunities for positive engagement in learning; and successful integration and use of technology for educational purposes (Amry, 2018; Jones-Roberts, 2018). Each of these elements is explored, as they form the foci of the work presented in this paper.

2.1 Community

Community is a keystone aspect of online learning. Community in online learning may be defined as connection, social interaction with peers, and feeling a sense of belonging and has been shown to positively influence success of student's learning and outcome (Jones-Roberts, 2018).

According to Wang (2019), social interaction is "fundamental in human learning and development" (p. 114). Delahunty (2018) reported that the quality of the educational experience increases when social interaction is promoted and supported, fostering a sense of belonging; furthermore, individuals who are actively engaged in discussion forums created a commitment to fostering community. Chen et al. (2018) echo this, noting that the quality of social interactions and discussions influenced the strength of a course's sense of community and ultimately, the level of student success. Fostering community is a key component to a student's academic success and ultimately meeting the learning outcomes behaviorally, cognitively and affectively (Busselli et al., 2023; Chen et al., 2018; Galikyan & Admiraal, 2019; Jones-Roberts, 2018; Peddibhotla & Jani, 2019; Wang, 2019).

A strong online community however provides a positive social presence, affirmatively impacting students' motivation, engagement, participation, and overall success (Jones-Roberts, 2018). Social presence is identifiable through connection, group cohesion, and good communication; characteristics linked to helping students experience a feeling of belonging (Baisley-Nodine et al., 2018). Students who experience a higher feeling of social presence, authentically representing their personal identity to their peers, are more likely to contribute quality content to discussions, participate in higher-level thinking, and are less likely to drop their course (Baisley-Nodine et al., 2018; Jones-Roberts, 2018). Social presence aids in countering feelings of loneliness or disconnectedness imposed by technology.

Like any learning environment, challenges may arise in online learning related to cultivating an environment that facilitates social interaction (Jones-Roberts, 2018; Niinivaara & Vaattovaara, 2018). Amry (2018) suggested that a tool's usability and students' habits influence their perceptions of social presence, which correlates with their participation levels. Strategies to support student's improved academic performance and cultivate feelings of community include implementing an introductory post at the beginning of the course to help foster and encourage social presence, and holding regular, weekly, or bi-weekly discussions to provide opportunities for post-secondary students to express their personality to peers and learn about each other (Jones-Roberts, 2018).

2.2 *Engagement in Learning*

Student engagement is meaningful student involvement throughout the learning environment and learning process (Coates, 2006; Osborne et al., 2018). Traditional learning environments often offer inadequate supportive opportunities for student engagement, potentially leading to feelings of isolation (Amry, 2018). Students in large classes can feel disengaged, hesitant to share in discussions, and are more likely to remain anonymous due to pressures and discomfort with class size (West et al., 2015).

Creating a space of unity and maintaining social and teacher presence, as well as being appropriately competent with the digital tools used (Massey et al., 2019; Niinivaara & Vaattovaara, 2018) are meaningful ways to keep students engaged in the higher-education learning process. Quality engagement fosters students' development of belonging and a strengthened identity (Delahunty, 2018; Korhonen et al., 2019). This, in turn, may lead to feeling accepted, encouraged, and valued by both peers and instructors (Delahunty, 2018; Korhonen et al., 2019). Ultimately, the online space allows all students to contribute to the learning environment, rather than only the most outspoken students (Busselli, Holdan & Rota, 2023). Further, better and improved quality of knowledge, career readiness, improved grades, as well as links to a better professional identity, overall well-being, a general satisfaction, and improved ethical qualities are also noted as positive outcomes of meaningful engagement (Jones-Roberts, 2018; Korhonen et al., 2019; Massey et al., 2019; Osborne et al., 2018).

Osborne et al. (2018), investigating collaboration and participation among students and facilitators in discussion forums, noted many students posted the minimally required content or posted near the due date, hampering the opportunity for discussion and learning. These students suggested expectations for posts were not clearly communicated, contributing to poor assessment results, nor was it clear to these students how much opinion and personal reflection should be used versus academic literature. Students suggested that assessing discussion posts was counter-intuitive to promoting organic discussion and they found it difficult to create conversation and meaningful discussion online. Finally, students suggested having an instructor present hampered their ability to have candid discussions and suggested that smaller groups could better facilitate connection and meaningful discussion.

For students to feel successful and to avoid ambiguity around expectations, facilitators must outline clear objectives and learning outcomes. Work by Peddibhotla and Jani (2019) promoted using targeted, specific prompts and examples to encourage students to think at a higher level and contribute in-depth responses while engaging in quality discussion. Facilitators should provide examples and model the qualities of a good post to set academic expectations and help students make well-informed judgements about their own and others' posts. Creating structure within the discussion helps increase quality of engagement and overall learning (Sarja et al., 2018).

There is an art to the facilitation of discussions, to finding the right balance of student autonomy versus interjection to help keep them on track. Conflicting research appears in relation to the optimal size of discussion groups and amount of instructor interaction. Peddibhotla and Jani (2019) noted that participation increased in smaller groups when the instructor was more involved, helping guide a

structured discussion. These guided small group discussions revealed a diverse sample of students with varying experience and points of view, contrary to general preconceptions. Chen et al. (2018) concluded that high enrolment courses need small group-based discussions to help facilitate discussion in a more connected and meaningful way. In contrast, participation increased in larger groups when the facilitator was less engaged in guiding the discussion and there was less structure. The authors suggest that this was due to some individuals in a large group feeling motivated to take the lead in discussion (Peddibhotla & Jani, 2019). Regardless of group size, Peddibhotla and Jani (2019) demonstrated that students found structured discussion to be the most engaging for their learning. These findings influenced our design of course discussions as things of which to be mindful.

2.3 Asynchronous Discussion Technology

A common form of knowledge sharing and building in online learning is through asynchronous discussion tools or forums. Asynchronous discussions are a popular communication vehicle in online courses, across a wide variety of disciplines (Tang & Hew, 2017) as their flexibility helps facilitate stronger social interaction and overall learning (Kurnaz et al., 2018) while providing ample time to respond to posts in a thoughtful, organized manner.

Discussion tools provide virtual community spaces for students to collaborate, share ideas and engage with one another, (Galikyan & Admiraal, 2019) while potentially reducing feelings of isolation (Delahunty, 2018). Additionally, their use has been shown to improve literacy skills, enhance learning and reflection, promote community, and facilitate exploratory learning (Baisley-Nodine et al., 2018; Chen et al., 2018; Osborne et al., 2018). Discussion participation creates social presence, which fosters feelings of belonging (Baisley-Nodine et al., 2018). Increases in student belonging and engagement are positively correlated with student success (Baisley-Nodine et al., 2018). Shy or insecure students often perform better in asynchronous discussion as they can express their thoughts without the stunning spotlight sensation (Busselli et al., 2023; Kurnaz et al., 2018; Peddibhotla & Jani, 2019) while having sufficient time to research appropriate responses. Discussion tools afford active learning wherein students are encouraged to participate collaboratively and equally, ultimately making them more accountable as their work is captured in a digital record (Alzahrani, 2017; Peddibhotla & Jani, 2019). Opportunities for networking and creating other academic and professional connections is also a potential attraction. Students are more in charge of their learning and report positive influences on their studies (Amry, 2018) within flexible learning environments, such as discussion forums. Discussion-based tools enable students to connect with instructors in a semi-formal manner, which, for some students, is appealing (Ronto et al., 2021; West et al., 2015). Allocating grades to discussions motivates students to engage with one another and the course material (Osborne et al., 2018; Wang, 2019).

Similar to regular discussion tools, micro discussions tools, like X (formerly Twitter), help facilitate engagement through increased communication among all class members, collaboration with peers and engagement with course material (Amry, 2018; Osborne et al., 2018; Rohr, Costello & Squires, 2023; Rohr, Squires & Peters, 2022; West et al., 2015). This engagement allows students to share their knowledge by connecting the course material and real-world events while negotiating understanding and co-constructing knowledge with their peers (Woods et al., 2023).

Micro discussion tools, which employ concise posts (a couple of sentences long), are often adopted in hopes of increasing student participation, supporting a communal learning environment, and promoting collaboration (Kurnaz et al., 2018; Tang & Hew, 2017). Since 2007 Twitter has been one of the top user-friendly tools adopted by educators (Tang & Hew, 2017). From an academic perspective, the challenge of posting one's thoughts within a tight character limit of 140 or 280 requires students to hone their critical thinking skills while focusing on the discussion topic. A similar experience may be achieved through other social networking or in-house discussion tools, configured with post length limits. In-house discussion tools see students communicating within controlled networks while maintaining a stronger degree of privacy than open micro discussion tools. This additional security fosters students' comfort and connectedness to others within the course.

Asynchronous discussions present some challenges in higher education. The threads of conversations are sometimes difficult to navigate, as posts can be disjointed, disorganized, duplicated, and not directly related to the original thread. Discussion forums may further divide stronger students from weaker students (Chen et al., 2018). Massey et al. (2019) suggests students may feel judged by their peers based on their thoughts and quality of their post. This is particularly true for international students who report feeling insecure when speaking in class due to language barriers (Zhang & Kenny, 2010). Lurking behavior, wherein students read others' posts but do not fully participate in discussions (Alzahrani, 2017; Delahunty, 2018), could also amplify this divide. Such behavior can negatively affect discussion quality and others' learning due to the reduced interaction between students.

As with any educational technology, micro discussions may both positively and negatively impact student engagement and learning (Charbonneau-Gowdy & Chavez, 2019; Massey et al., 2019). While the 2017 increase in Tweet characters from 140 to 280 provided learners more space to share their thoughts (Rohr, Costello & Hawkins, 2018), it is not clear how group size impacts learners' engagement and social presence when interacting through micro discussions.

2.3.1 Group Size

It has been suggested that group size affects social presence and engagement in online learning (Akcaoglu & Lee, 2015; Peddibhotla & Jani, 2019; Qui & McDougall, 2015) where discussion forums and other collaborative asynchronous tools are integrated. Peddibhotla and Jani (2019) found that a structured discussion within a smaller group was more effective for supporting student engagement and learning, while a less structured discussion was more effective for a large group. Qui and McDougall (2015) suggest that students in larger groups do not participate or contribute as actively when compared

to smaller groups. Higher quality and more frequent posts were found to be associated with smaller sized groups, as well as increased demonstration of engagement and community (Qui & McDougall, 2015). Akcaoglu and Lee (2016) echoed that increased connection, social presence, and feelings of community were found in smaller groups. In a survey they gave to students regarding the small discussion group size, one student reported, “it was easier for them to get to know one another, engage in deeper conversations, and think more deeply” (p 11). More recently, Chen and Liu (2020) noted a similar pattern of engagement when group size was around 30 students. Though, some may consider 30 to be a large discussion group size.

2.4 Research Focus

In our study, we investigated whether group size affected students’ perceived learning, engagement and sense of community while using asynchronous micro discussions. We looked at survey results from three sections of a high enrolment first-year university course. With a focus on pedagogy, each section’s intentional course design and delivery were similar except for the teaching assistant assigned to each section and the members of the discussion groups, which were of different sizes, with 80, 40 or 20 students in each section.

3. Methods

3.1 Research Model and Procedure

This research used survey data collected anonymously from postsecondary students enrolled in an introductory course at a comprehensive, mid-sized university in Eastern Canada over two semesters. Although sought, it was determined by the Interdisciplinary Committee on Ethics in Human Research (IRB) that ethics clearance was not required for this evaluative project of an instructional intervention. The survey instrument was validated in a previous study (Rohr, Costello & Hawkins, 2018; Rohr, Costello & Squires, 2023).

In Fall 2019 and Winter 2020, 234 and 224 undergraduate students, respectively, completed a first-year online course focused on fitness and wellness. This course is a popular elective, offering students an opportunity to explore factors that may influence overall wellness and learn to identify strategies to maintain and potentially improve their own health.

3.2 Research Context and Sample

Although open to all undergraduate students, first year students, with limited prior online learning experience, typically register for this course. As students self-selected to register for all elective courses, our sample was one of convenience. For the purposes of management and organization, students self-selected one of three sections offered in each semester, each capped at 80 students. On average, students were 21.8 years of age with the majority of students identifying as first or third year.

To explore the impact of cohort size on engagement and social presence, sections of the courses were organized in varying group sizes using the Learning Management System (LMS) supported by the university. One section remained as a cohort of 80 students (G80), another was separated into two groups of 40 students (G40), and the final section into four groups of 20 students (G20). This grouping was always indiscernible to students. The students were auto assigned to the groups using features of the LMS.

As part of the course requirements, students were asked to complete three discussion events, scheduled during weeks 6, 10 and 12 of each semester. The asynchronous micro discussion tool was developed in-house and was designed to emulate the experience of a Twitter chat. The tool was pilot-tested for its usability with experienced and unexperienced microbloggers. Refinements were made to it prior to deployment in the course. The tool was embedded in the course home page and secured within the LMS. Unlike Twitter, the discussions were closed to anyone not enrolled in the course. Each of the three discussion events had a topic or question to which students were required to first, complete an original post, and second, complete a response post to a comment made by another student in their group. Students were free to contribute more to the discussions if desired. Students were required to type their posts in a designated area and submit for group members to review, effectively limiting the discussions to their respective groups of 80, 40 or 20 peers. Events were graded using the same rubric for consistency and provision of expectations. Students received instructions on how to use the tool and the university learning support help desk provided assistance as requested.

Topics for the three discussion events were tightly linked to course content following work of (Rohr, Costello & Hawkins, 2015). The first event asked students to comment on the results of a student-completed survey that explored students' relationships with different aspects of wellness. Survey aggregate data was posted, and students were specifically asked to link survey results to course content to complete their assignment. In the second discussion event, students were asked to share a recent (12-month-old or less) news story, related to course concepts of health and wellness. Students were asked to reflect critically on the news source and again link the story to course materials in their post. For the final discussion event, students were asked to reflect on the information they had learned from both monitoring their mood throughout the semester and reviewing course material. Specifically, students were asked to comment on how daily life events and daily routines effected their mood and to highlight any activities or thought processes, or both, that have positively impacted their mood. Students were also encouraged to share tips for improving mental health and wellbeing or comment on things to be aware of when observing friends and family members' low moods, or both.

3.3 Instrument Used

An anonymous survey was administered in the final two weeks of each semester, through the LMS's survey tool to all three course sections. The questions were developed based on existing literature, our research questions, and our earlier work on engagement in online learning environments (Rohr, Costello & Hawkins, 2018; Rohr, Costello & Squires, 2023; Rohr, Squires & Peters, 2022). All students were invited to complete the 24-question survey, containing almost exclusively close-ended questions, with one final open-ended comment question. The primary focus of the survey was to assess students' experiences with the asynchronous micro discussion tool during the semester: Did students use the tool? Did the asynchronous micro discussion tool encourage interactions and engagement in learning, and did it contribute to a sense of community in the online environment?

3.4 Data Analysis

The post-semester survey covered a range of topics including feelings of belonging, sense of community, engagement in learning, and the use of the discussion technology. The results from two course offerings (six sections) are combined and presented here. For each of the areas under investigation, community, engagement in learning, and technology, the results are presented in tabular format, per section. Novel or key findings are highlighted. Student responses to the open-ended question are also presented, where novel or contradictory to the close-ended questions' responses were found.

4. Results

Survey responses were received from 185 students, out of a possible 458; 99 from the fall semester and 86 from the winter. This equates to a 40.4% response rate. From fall 2019 responses received per section were 26 from G80, 41 from G40 and 32 from G20. Winter 2020 received 26 from G80, 31 from G40, and 29 from G20. Although it was embedded in the course requirements, not all students participated in all three discussion events (G80, 74%; G40, 61%; and G20, 50%), with two out of three events being the next highly reported (G80, 18%; G40, 28%; and G20, 30%). No details about student's ethnicity, gender identity or other demographic information was available or requested.

4.1 Community

Three survey questions focused on students' perceptions of the sense of community stemming from their interactions within the discussion tool found in their respective sections. Results of these questions are shown in Table 1. Some findings of note are discussed here.

In response to the question regarding feeling a sense of community, G80 reported the highest result for feeling "really connected", and feeling "connected with a few individuals", compared to G40 and G20. Fewer respondents indicated they did not feel connected to their classmates, but it would have been nice to feel connection when compared to those who felt some degree of connection.

When students were asked how the discussion tool use compared to other online courses in terms a creating a sense of community and belonging, the results were similar across the groups. While some students reported feeling more connected in this course, most students across all three sections reported feeling the same degree of connectedness in this course as others. Small percentages, (G80, 6%; G40, 21%; and G20, 22%), reported feeling less connected in this course than other online courses.

Students were asked if they felt the use of the discussion tool helped bring them closer to their classmates. The majority (see Table 1) responded “no”. However, the written feedback reflected some positive experiences. One student responded,

“I feel that the discussion events in [...] allowed us students, as a class, to connect with one another and gave us a place to share our thoughts and opinions about the course material.” (Student P)

Table 1. Percentages of Responses Regarding Sense of Community

Question Focus	Options provided	G80	G40	G20
feeling a sense of community as a result of the discussion tool use	really connected	20	14	19
	feeling connected with a few individuals	43	27	24
	did not feel connected to their classmates but it would have been nice	24	31	36
	means to an end-communications and grades, period	14	27	22
how the discussion tool compares to other online courses in terms a creating a sense of community and belonging	more connected	22	23	25
	the same degree of connectedness	57	40	44
	feeling less connected	6	21	22
use of the discussion tool helped bring them closer to their classmates	yes	49	42	39
	no	51	58	61

4.2 Engagement in Learning

Seven survey questions focused on students' experience of engagement in learning. The results, shown in Table 2, show combined responses for strongly agree and agree, or strongly disagree and disagree.

Overall, in terms of learning and understanding the course material, students reported gaining a stronger understanding of course material using the discussion tool. When asked whether the discussion events enhanced understanding of the course material, most students strongly agreed or agreed (G80, 88%; G40, 64%; G20, 74%).

While some students indicated they hoped they did not have to use the tool in another course, others indicated they wished more classes would integrate the discussion tool into course activities (G80, 64%; G40, 56%; and G20, 63%). Students were in favor of using the discussion tool as part of the course requirements (evaluation) with results (G80, 69%; G40, 54%; and G20, 64%) showing agreement.

Students agreed the discussion events required a reasonable effort for the value of the assigned grade (G80, 82%; G40, 85%; and G20, 80%). Further, students indicated the discussion tool helped them engage more with real life examples and strongly agreed that the discussion event encouraged them to read the news and learn about current events in a way that they would not have otherwise (G80, 81%; G40, 67%, and G20, 67%). One student responded,

“It created an informal environment to comfortably share thoughts and feelings as they related to course material.” (Student R)

Discussion events were one aspect of assessment in the course. Students were asked how these events compared to in-class assignments in terms of workload. Though marginally, most students selected “less work” (G80, 62%; G40, 48%; and G20, 50%). Another student commented,

“This was my first experience with this type of discussion tool and I really, really enjoyed it! I hope this type of tool is added to other online courses!!” (Student E)

Table 2. Percentages of Responses Regarding Engagement in Learning

Question Focus	Options provided	G80	G40	G20
if the discussion events enhanced understanding of the course material	agree	88	64	74
	disagree	12	36	26
if they would like to have other courses use the discussion in course activities	agree	64	56	62
	disagree	36	44	38
if they hoped they did not have to use the tool in another course	agree	31	45	46
	disagree	69	55	54
use of the tool helped them to understand the course material better	agree	88	65	71
	disagree	12	35	29
encouraged them to read the news and current events more actively	agree	81	67	67
	disagree	19	33	33
discussion events required a reasonable effort for value of assignment grade	agree	82	85	80
	disagree	18	15	20
how discussion events compared to in-class assignments	more work	0	4	7
	about the same	30	39	32
	less work	62	48	50
	I don't know	8	23	8

4.3 Asynchronous Discussion Technology

Four questions focused on students' experience in using the discussion tool. The results are shown in Table 3. Some findings of note follow.

Most students in each group agreed or strongly agreed that the discussion was a straightforward way to use information learned from class (G80, 92%; G40, 75%; and G20, 81%). Students' thoughts on whether more classes should integrate discussions into course evaluations indicated high levels of agreement (G80, 69%; G40, 54%; G20, 64%). When compared to use of discussion forums in other online courses, students liked the discussion tool better or about the same (G80, 30%; G40, 43%; and G20, 38%). However, one-fifth, to one-quarter of the students could not say, as they had not participated in asynchronous discussions in other courses (G80, 8%; G40, 23%; and G20, 8%).

When asked about communication challenges with the discussion tool, few students reported trouble with communicating through the tool. Some students reported having technological issues such as with hardware or their computer while other students reported having issues using the tool due to inexperience. In all groups, students identified "not having enough characters to express their thoughts" as the main issue in using the discussion tool (G80, 39%; G40, 38%; G20, 31%).

When asked to select responses from a list of 12 options provided in relation to what they felt the discussion provided, students top responses included: interaction with classmates (G80, 12%; G40, 15%; and G20, 13%), engagement with real-life examples (G80, 12%; G40, 14%; and G20, 13%), engagement with course material (G80, 12%; G40, 11%; and G20, 11%), a way to show my understanding of course material (G80, 13%; G40, 11%; and G20, 12%), and greater course participation (G80, 11%; G40, 10%; and G20, 11%). Responses to both interaction with the course instructor and the course did not promote any interaction were selected two percent or less of the time in all sections.

Students were asked an open-ended question to provide final feedback on their experience with the discussion tool. The comments were broken down into themes, of which 12 were identified. G20 students reported the most trouble with technology (G80, 25%; G40, 24%; and G20, 39%). One student's response in relation to technological difficulties was,

"I feel that it is a good concept, however, the technology used for it could have been better. Sometimes it can be slow, glitchy, and difficult to post. I only tried it on my laptop but I feel that it would likely be more difficult on a cell phone, if someone had to do that."

(Student K)

Other suggestions noted by the G20 students included: the character limit was too small, they received a poor grade, they had difficulty finding the tool, and that notifications could be helpful. G80, the larger group size, reported having a good experience with no major issues (45%), whereas notably fewer students in the other two, smaller group-sized sections (G40, 22%; and G20, 6%) reported having a good experience with no major issues. In relation to the word count, one student's feedback was,

"The character limit did help in writing critically; however, it took me a great deal of time to try to word my post in fewer words while still getting my message across. I would spend a few hours just trying to refine my post, which makes me feel like perhaps they should be worth more." (Student N)

Table 3. Percentages of Responses Regarding Technology Used

Question Focus	Options provided	G80	G40	G20
wish more classes would integrate discussions in course evaluation	agree	69	54	64
	disagree	21	46	36
events were a straightforward method to use information gained in class	agree	92	75	81
	disagree	8	25	19
sorts of issues, if any, experienced when using the discussion tool for the course	I had no issues.	27	14	21
	I had issues with the character limitation of the discussion tool	39	38	31
	I had software issues (first time using the discussion tool, etc.)	14	28	26
	I had technology issues (hardware, computers, phone, etc.)	20	20	23
how discussion event compared to discussion forums in other online courses	I like them better than discussion forum activities	35	31	24
	I like them about the same than discussion forum activities	25	24	22
	I like them less than discussion forum activities	14	24	36
	I cannot say as I've never used the discussion forum in a course before	25	20	19

5. Discussion

Participation among students is central to building connection in the online learning environment. Palloff and Pratt (1999) state, “without the support and participation of a learning community, there is no online course” (p. 29).

In terms of engagement, community, and tool usability, the largest group, G80, responded more favorably, though not substantially so, in the majority of categories including feeling more connected to classmates, having fewer issues with the technology, and gaining a better understanding the course material. Interestingly, this contrasts Chen et al. (2018) who suggest smaller groups help facilitate discussion among students and Peddibhotla and Jani (2019) who demonstrated that larger and therefore, more unstructured groups were supportive of learning outcomes, but not necessarily student engagement or building community. Interestingly however, Luo et al. (2023) noted group sizes of approximately 38 students demonstrated enhanced student interaction compared to groups with three students.

While many of our results mirror others (Amry, 2018; Baisley-Nodine et al., 2018; Delahunty, 2018; Jones-Roberts, 2018; Lou et al., 2023; Massey et al., 2018; Osborne et al., 2018; West et al., 2015), a few were in notable contrast (Akcaoglua & Lee, 2016; Chen et al., 2018; Peddibhotla & Jani, 2019; Qui & McDougal, 2015). The discussion section is organized by the three primary points of interest: community, engagement in learning, and technology.

5.1 Community

Classroom and community connection received roughly half the responses to questions relating to community and connection, with feeling connected to other students being a top theme. This may be due to students' interpretation of the term posed in the question; "interaction" versus "connection". It is important to note the difference between "community", and "engagement", as students can be engaged and continue to learn, but not necessarily feel part of a community, or vice versa. Students felt the online discussion tool promoted interaction between peers, but not with instructors. Although the instructor accessed the discussion forum and was able to interact, there was very limited instructor contribution to the micro discussion. Intentional instructor interaction may be a key for community building (Chen et al., 2018). Furthermore, Peddibhotla and Jani (2019) demonstrated that larger and therefore, more unstructured groups were supportive of learning outcomes, but not necessarily student engagement or building community.

Sixty-one percent of students in G20 responded "no", when asked if the discussion tool brought them closer to their classmates. This aligns with Luo et al. (2023) who found that group sizes of approximately 38 students demonstrated enhanced student interaction compared to groups with three students. However, when asked what value the discussions provided, students indicated interaction with classmates (G80, 12%; G40, 15%; and G20, 13%). These findings are in alignment with most of the literature (Baisley-Nodine et al., 2018; Delahunty, 2018; Jones-Roberts, 2018; Kurnaz et al., 2018; West et al., 2015) that explores social connection and asynchronous discussions. Our results reinforce that the technological piece worked well; students were able to use the tool effectively, learn the course content and interact with one another. Where the data showed lower values was how the asynchronous micro discussion tool supported and influenced a sense of community among students. It has been generally supported that discussions enhance feelings of community and connection among students (Delahunty, 2018; Jones-Roberts, 2018; Wang, 2019), however, this was not reflected in our results. When compared to other online courses students undertook at this university, it was found that most students in all groups experienced approximately the same level of connectedness as within this course. Further exploration of the type and amount of interaction may reveal more about the sense and strength of community in a higher education online course. This is an area of potential further research.

5.2 Engagement in Learning

Overall, in terms of learning and comprehending course material, students reported feeling they gained a stronger understanding of course concepts through use of the discussion tool, similar to Alzahrani (2017). Other researchers echoed this (Chen et al., 2018; Massey et al., 2019; West et al., 2015), by demonstrating that participation in online discussion tools enhanced learning and understanding of course material.

Students in G80 indicated that the discussion tool provided greater course participation, overall, aligning with Amry (2018) who suggests that discussion tools can help enhance students' learning through self-guided and self-motivated research and interaction, as well as a flexible learning environment that encourages students to take responsibility of their learning experience. This strategy was reflected in the course's learning design. Similarly, Massey et al. (2019) found that students who participated in discussions felt encouraged to engage with peers as well as the material; resulting in enhanced interactions among peers and learning. Previous literature reported similar results (Baisley-Nodine et al., 2018; Delahunty, 2018; Korhonen et al., 2019; West et al., 2015). To increase engagement further, and to provide a better understanding of course outcomes, using a rubric and providing clear descriptions of assessment requirements when using an online discussion tool are needed for students to fully understand expectations (Massey et al., 2019); both of which were incorporated into this course's design.

5.3 Asynchronous Discussion Technology

Students in all sections reported having varying degrees of technological difficulty, with significantly more complaints related to technological issues from the smallest group, G20 (39%). We are unable to explain this finding as group assignments were randomized by the LMS. Additionally, the survey did not define "difficulty with technology" which could have included challenges resulting from their devices, poor browser choice, the LMS or something else entirely.

In their work, Niinivaara and Vaattovaara (2018) investigated technological challenges with discussion tools and confirmed students' concerns included poor usability and a lack of tool understanding. Both complaints surfaced from students in all sections of the courses we investigated. Similarly, Massey et al. (2019) found students' uncertainty around discussion tool use fostered disengagement, primarily due to lack of understanding or technological knowledge, as well as privacy concerns of the platform. They suggested tutorials might be an effective way to help bridge this gap for many students. While we provided instructions on how to use the discussion tools in the events, it is possible that some students did not refer to them when they encountered technological challenges.

Many responses from our students, in all groups, voiced frustrations or concerns with the shorter character limit imposed with the discussion tool (280 characters), stating they were unable to fully express their thoughts and ideas with this constraint. Some students suggested using multiple posts to enhance communication, aligning with Tang and Hew (2017) where students reported the 140-character limit was too short, limiting their opportunity to create in-depth posts and therefore

leading to misinterpretations and poor communication. Based on our data it is difficult to suggest an optimal character limit for micro discussion posts. Further inquiry about the specifics of character length optimization may be an area of future study.

5.4 Implications

The implications of this study relate to how asynchronous micro discussions are used in high enrolment undergraduate courses. Consideration for carefully designed intentional learning activities and assessments in a course's design is paramount. Discussions need to be driven by the course learning outcomes. Micro discussions may be a way to increase and maintain connection, build community and foster engagement in learning. Smaller discussion groups respond well to structured discussions that involve instructor interaction. When larger groups are used for discussions, they should be loosely structured. Here, the instructor should take on a primarily observer role, interjecting to keep the discussion on track or clarify misunderstandings. Clear explanations of activities and expectations of participation, including assessment grading, must be explicitly stated. Selection of asynchronous discussion technologies should take into consideration the affordances the technology offers and desire to use an open or public tool versus a restricted or course-only discussion space. Consideration of the value of restricting students' responses versus the development of critical thinking skills and disposition should be weighed. Potential rewards for thoughtful course design may reveal students who take responsibility for their learning, engagement in real-world activities, and provide opportunities for students to hone critical thinking through data analysis, introspection and concise reporting of results.

5.5 Limitations and Future Research

One limitation relates to the lack of demographic data gathered from participants. Convenience sampling was used wherein all students enrolled in the course were invited to participate in the survey. As we did not collect details about student's ethnicity, gender identity or other demographic information, we were unable to analyze our results in relation to any of these factors. By consequence, without additional demographic data, we are restricted from generalizing the results beyond the introductory, online, high enrolment post-secondary environment. However, our focus did not include differentiating results based on demographic information, so its absence is less significant in this reporting. As the world evolves in its understanding of gender, it begs the question of whether bi-lateral gender-related differences in research remain relevant.

Potential future research could focus on interaction type and community and character limits. For example, the relationship between interaction type in asynchronous micro discussions and its connection or prediction about the sense and strength of community in adult learning online courses is of interest. Here, students felt more engaged in their learning and connected to their peers, but did not feel a strong sense of community. Therefore, the relationship between community and engagement needs further exploration. Distinguishing between connection, cohesion and community could be explored more fully to determine which aspect is most at play in micro discussions and which more closely influences engagement in learning. Another area needing more study is determining the optimal

group size to build community and provide engaged learning when using asynchronous micro discussions in online courses. This is an area which hails varying results in the literature. In other words, how small does a discussion group need to be to foster a sense of community while strengthening student engagement in learning? To this could be added the question of how frequent and of what nature should the group interaction be to best foster community.

6. Conclusion

This paper reported on a comparison of three course sections over two semesters, each with different discussion group sizes to determine whether and how asynchronous micro discussions affected students' sense of community and engagement in learning in an introductory university course. Findings echoed others' results relating to the impact of group size on sense of community, engagement in learning and use of asynchronous discussions in higher education (Qui & McDougall, 2015; Luo et al., 2023). A notable result, little reported in the literature, was that our data reinforced that larger groups. In this instance a group size of 80 students, had the greatest positive impact on community and engagement compared to the smaller groups. Regardless of discussion tool type, be it a typical discussion forum with 300+ characters or a micro discussion tool with lower character limits (140 or 280+), student experiences are generally similar. These experiences ranged from enjoying and finding the activity interesting; technical issues that impeded discussion; the need for clear expectations to improve the likelihood of successful, appreciation of engaging discussion and co-creation of knowledge; and to the need to share of oneself and engage in supportive interaction with peers to foster a positive sense of belonging (connection) and community. These results emphasize the importance of pedagogical or instructional (learning) design, including clear instructions and expectations, degree of instructor participation in active discussions, mechanisms that foster student responsibility for their learning through active participation and collaboration, and learning to reflect on the opinions of others in micro discussions.

Overall, the asynchronous micro discussion tool was generally effective in facilitating student interaction and engagement with course material in large groups. While students felt more engaged with and connected to their peers this did not, however, translate into a strong sense of community. It may be reasonable to say that community was burgeoning. Larger sized groups with structured activity and minimal instructor interaction seemed to exhibit stronger engagement in learning.

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