

## Discussion forums: A misnomer? Examining lurkers, engagement and academic achievement

**R. Brunton**

Charles Sturt University

**J. MacDonald**

RMIT University, Australian College of Applied Psychology, and Charles Sturt University

**N. Sugden, B. Hicks**

Charles Sturt University

Discussion forums are often touted as maximising student participation and learning but concerns around engagement counter any perceived benefits. Often participation is the measure of engagement, and students who do not post are deemed unengaged. To further examine engagement and forums as learning communities, we used analytic data from 270 students enrolled in two online psychology subjects using social network analysis and interviewed 22 students. Both subjects' forums had greater egalitarian triads, indicative of reciprocal relationships. Furthermore, both active posters and lurkers had a mix of grade bands indicating that some lurkers still achieved academically. Lurking was a key qualitative theme along with checking for assessment information and intimidation. For both subjects, students were engaged with the forums, and differences in connectivity were consistent with the different subject content. However, forum activity indicated that these forums were more like subscription services than communities of practice. We propose that forums can be transformed into dynamic teaching spaces through understanding the multidimensionality of engagement, setting the expectation and tone of the forum as a safe place, and enhancing the platforms so visible indicators show that posts have been read or consumed. We further propose that students who engage but do not post be called *quiet participants*.

*Implications for practice or policy:*

- Educators and researchers can improve the understanding of engagement with discussion forums by acknowledging the distinction between participation and engagement.
- Online providers can assist in transforming these online platforms into dynamic teaching tools through enhancements that indicate a post has been read.
- Educators can increase engagement by setting the tone and expectations for the forum.
- Replacing the negative term *lurker* with quiet participants better reflects the activity of these students.

*Keywords:* lurkers, discussion forums, engagement, achievement, social network analysis, mixed methods

### Introduction

Online teaching in higher education has increased in recent years (Douglas et al., 2020). Technological advancements such as web conferencing, interactive learning activities, reliable and accessible internet, and global pandemics have contributed to this exponential rise (Dumford & Miller, 2018; Sugden et al., 2021). Moreover, the flexibility and opportunity for social connectivity that online learning provides (Decker & Beltran, 2016) is attractive to students, especially those studying remotely or managing work or family commitments (Sugden et al., 2021). *Discussion forums* (we use this term to refer to any online platform used for asynchronous teaching and built into the learning management system [LMS]) are ubiquitous in online learning (Morris & Stommel, 2013) and often touted as maximising student learning and involvement (Alzahrani, 2017; Yee & Ean, 2020). Forums provide virtual classroom discussions, with many believing the online version to have additional benefits such as more time to reflect before responding and an alternate means of uploading course or subject links and files (Alzahrani, 2017; Harman & Koohang, 2005; Morris & Stommel, 2013). Yet, despite their ubiquity and perceived benefit, the extent that these

platforms contribute to achievement is unclear. Indeed, benefits concerning student achievement are often countered by concerns about student engagement (Decker & Beltran, 2016; Morris & Stommel, 2013).

### **Engagement, participation and lurking**

The goal of education is student achievement (Alzahrani, 2017). Student achievement has been linked to social constructivist pedagogies that engage the student and provide peer-to-peer collaboration (Alzahrani, 2017; Taylor & Parsons, 2011, provides a review). Learning, according to these paradigms, is a social activity (Lave & Wenger, 1991; Vygotsky, 1962) where the teacher guides the student to use their knowledge in a collaborative environment. Therefore, discussion forums, which are conducive to collaboration, social connection and the sharing of previous experiences and perspectives (Harman & Koochang, 2005), are consistent with this paradigm. Despite this, online students generally seek these connections for study-related matters rather than social reasons (George et al., 2021); thus, many do not avail themselves of the opportunities for connection that forums provide (Dennen, 2008).

The visual evidence of posting (i.e., number of posts) is commonly used to measure engagement with forums (Dennen, 2008). Engagement, which broadly refers to involvement in any educational activity that contributes to its mastery (Martin & Bolliger, 2018), is a risk factor for attrition (Bond et al., 2020, provides a review). However, this proxy for engagement disregards students who visit the forum without posting. Indeed, these students who consume content, but do not post, are deemed unengaged. By assessing engagement using visible behaviour only overlooks the cognitive and emotional aspects of engagement. As reading posts falls under the rubric of any educational activity, lurkers are still learning through observation and may be engaged by consuming the content. Therefore, making a distinction between student engagement and student participation is necessary to understand the benefits of discussion forums.

Demonstrating this point, Dennen (2008) investigated these peripheral students in the context of blended learning educational courses. Students indicated they were more likely to be active posters than readers, with more than 75% reporting that they read all posts before posting, and fewer than 25% stated they felt uncomfortable initiating a discussion. Most said they posted because it was required (90.6%) and approximately two-thirds posted so the teacher could see their contribution. Only about half participated because they wanted to share an opinion, and less than 25% posted to help articulate an idea. Common reasons for lurking were to find a message to respond to (68.8%) or a model to follow (59.4%) or avoid making a redundant response (59.4%). Of interest is that over half lurked to learn more about the topic. These motivations are consistent with the positive correlations between self-reported comfort about participating and posting,  $r(32) = .61, p = .01$ , indicating that the posters were not intimidated by the task. Overall, these findings show that regardless of whether students posted or lurked, there was a level of engagement with the content and process.

Studies such as these provide evidence that lurking, as a type of vicarious learning, may be beneficial. This benefit potentially comes from the ability to focus on understanding and absorbing the content without the pressure of having to post (Dennen, 2008). This type of learning is consistent with Craik and Lockhart's (1972) levels of processing theory that posits deeper memory traces and greater retention are created by more elaborate cognitive processes; therefore, reading and reflecting are important components of engaging in the literature at a deeper level. When determining the effectiveness of a discussion forum, lurkers may indeed be engaged.

Without distinguishing between engagement and participation, educators may believe their forums suffer from a lack of engagement. To encourage greater participation, some teachers use structured and graded posts that are linked to assessment. These types of posts can motivate participation, but this motivation is likely extrinsic, related to the grade received not the learning itself (Dennen, 2008). Martin and Bolliger (2018) found that a quarter of students surveyed felt that discussion forums were the least valuable strategy to engage an online learner. According to Morris and Stommel (2013), graded posting constitutes attendance not engagement; therefore, graded posts or those with a requirement to read or respond likely assess participation only.

Despite concerns around participation, the benefits of discussion forums cannot be ignored. These benefits are usually measured by student achievement; for example, Alzahrani (2017) found that on-campus students taught using blended learning who used a weekly online discussion forum related to their course

and related subject content (no teacher involvement) showed greater knowledge gains than the control group who did not use a weekly discussion forum, although both groups did benefit from their learning. Of interest is that students who had greater participation (i.e., number of posts or replies to posts) also had higher academic achievement, but unfortunately, the researchers did not similarly analyse lurkers, so the extent that forums were beneficial for these students is unknown.

### **Discussion forums as a community of practice**

A benefit of discussion forum participation is contributing to community building (Decker & Beltran, 2016). This community building has been likened to a community of practice (CoP), a concept that emerged from the apprenticeship model whereby a novice acquires knowledge from an experienced practitioner (da Silva et al., 2019; Lave & Wenger, 1991). In the context of forums as a CoP, the experienced practitioner is not the teacher, but rather students are part of a collective process of learning. According to Wenger et al. (2002, p. 4), a CoP is formed through shared concerns, passions or problems about a topic, and learning occurs through continual interactions within that community. Therefore, students within a forum CoP are connected by a common desire to share and develop their course/subject-related knowledge consistent with constructionist pedagogies (da Silva et al., 2019; Yee & Ean, 2020).

Although students may be studying towards a common goal, the extent that discussion forums are a CoP is questionable. Decker and Beltran (2016) surveyed 65 postgraduate education students. These students felt that discussion forums were valuable and provided opportunities to connect with their classmates and hear others' perspectives and that this led to reflection and a deeper understanding of the content. Notwithstanding this, students were concerned that this forum dialogue was unnatural likely due to the mandatory and prescriptive nature of the task. In contrast, Yee and Ean (2020) found that interacting with peers in a safe space contributed to belongingness and autonomy. Moreover, when the discussion forums felt safe (i.e., no fear of repercussion), this positively influenced perceived satisfaction of online learning. However, given students in this study had met previously, their prior connectedness may have influenced their perceptions.

While the above findings suggest that discussion forums may provide benefit as a CoP, such a community is not controlled or created by a teacher, but rather formed informally and voluntarily by students (da Silva et al., 2019). Therefore, tasks that are mandated or prescribed are inconsistent with Lave and Wenger's (1991) conceptualisation of a CoP. According to Morris and Stommel (2013), the community created through regular posting and responding is instead a community of commentary. These communities are short exchanges and not collaborative learning networks desired by teachers. Therefore, the way the discussion forum is used as a teaching tool may influence the extent of meaningful engagement with the content or task.

### **Discussion forum participation**

While several factors have been proposed that may deter students from participating in discussion forums such as the forced nature of tasks (Decker & Beltran, 2016), anxieties around posting may also be a consideration. This is consistent with Sun et al.'s (2014) integrated model of motivational factors of online behaviours that identifies factors such as personal characteristics (e.g., personality traits), goals, desires, needs (e.g., social, achievement), and self-efficacy in motivating online participation. Support for this model comes from qualitative studies that suggest some students are shy about participating. Griffin and Roy (2019) found students avoided forums because of feelings of intimidation and appearing silly. Others felt that forums publicised "how stupid I really am" (p. 2). Henderson et al. (2017) found that students favoured alternative teaching platforms such as Facebook or Google Docs for collaboration, stating that the casualness of these platforms made interactions easier. One student felt more comfortable asking questions on less formal mediums than posting on a forum. Henderson et al. concluded that a student's "lived reality" may differ from what institutions believe are beneficial platforms for "technology-enhanced learning" (p. 1575).

This apprehension about posting on discussion forums could be explained by imposter syndrome. According to Sun et al. (2014) self-efficacy will influence one's desire and confidence to contribute online, and this is consistent with this phenomenon. Imposter syndrome first described high-achieving women who felt they were "intellectual phonies" (Clance & Imes, 1978, p. 1). Subsequent research has confirmed that

imposter syndrome may be more widespread to include students (Sakulku, 2011). Commonly, those with this syndrome have an intense fear of failure, lack confidence, and have a sense of inadequacy. This may come from difficulties internalising success, and thus the individual feels they have fooled others into thinking they are intelligent when they feel they are not. It stands to reason that someone who feels they are an imposter would lack the confidence to contribute to a forum. While several studies have examined imposter syndrome in higher education, most have focused on academics (e.g., Bothello & Roulet, 2019; Hutchins, 2015). To the best of our knowledge, no one has examined this phenomenon among students and discussion forums.

### **The current study**

Teaching tools and platforms are by their nature neutral (Morris & Stommel, 2013); it is the way they are used that maximise their potential. Harman and Koohang (2005) believe the value of discussion forums as teaching tools is yet to be fully realised; however, their benefits can only be gained if students engage with them. Participation can have a positive influence on online learning; therefore, engagement with discussion forums is important for achieving a desirable academic outcome (da Silva et al., 2019). But to what extent are we misreading the forum by assuming that students are unengaged if they are not visibly posting? Measurement of lurking is challenging as it is the measurement of non-observable action (Dennen, 2008), but the electronic footprint that lurkers leave can be extracted using LMS analytic data. Given this, we aimed to examine students' perceptions and use of discussion forums using a mixed-methods sequential approach. Students' perceptions of and attitudes towards discussion forums were gained from qualitative interviews and focus groups (FGs). We also assessed student use of discussion forums using analytic data. Therefore, this study makes an important contribution to the literature by considering both active posters and lurkers and examining what students say as well as what they do. The following research questions were examined:

- To what extent do forums represent learning communities?
- To what extent are students engaged with the subject forums?
- Do lurkers benefit from forums?

## **Method**

### **Participants**

This study was part of a larger project (see Sugden et al., 2021) with approval by the institutional ethics board. Data comprised LMS analytics, qualitative interviews and FGs. The LMS analytic data pertained to all 270 students enrolled in two online psychology subjects in 2018, Biopsychology and Social Psychology. The qualitative participants were recruited from this broader pool; six students participated in an online interview, and 16 in FGs (FG1,  $n = 9$ ; FG2,  $n = 7$ ). All students were incentivised to participate by the chance of receiving an AUD\$50 gift card.

Table 1 summarises demographic and enrolment data for the total pool, interview and focus groups. Participants were predominantly mature-aged, postgraduate, female, married, studying part-time, employed and working an average of 33 hours per week.

Table 1  
Demographic data

Demographic	Biopsychology	Social Psychology	Interview	Focus group
Gender (M/F)	26/136	38/149	0/6	2/14
Mean age (SD)	38.9 (10.3)	34.2 (10.4)	37.7 (8.7)	44.1 (8.3)
	<i>N</i> = 162	<i>N</i> = 187	<i>N</i> = 6	<i>N</i> = 16
<b>Education</b>				
High school	41 (25.3%)	76 (40.6%)	2 (33.3%)	
Diploma/Trade	16 (9.9%)	33 (17.7%)		2 (12.5%)
Tertiary	101 (62.4%)	71 (38.0%)	4 (66.7%)	11 (68.8%)
Unknown	4 (2.5%)	7 (3.7%)		3 (18.8%)
<b>Subject/enrolment information</b>				
Undergraduate	71 (43.8%)	134 (71.7%)		
Postgraduate	91 (56.2%)	53 (28.3%)		
Study mode (FT/PT)		39.8/60.2	0/6	2/14
<b>Enrolment</b>				
Biopsychology			4 (66.7%)	7 (43.8%)
Social Psychology			1 (16.7%)	2 (12.5%)
Both subjects		51	1 (16.7%)	7 (43.8%)

Note. M = male, F = female, SD = standard deviation, FT = full-time study load, PT = part time study load.

## Materials and procedure

We employed a mixed-methods sequential design (Creswell, 2013). Learning analytics data was extracted from the LMS. A 13-point topic schedule designed to assess participants' experiences with the subjects (e.g., use of resources, engagement) guided the interviews and FGs. The interviews ( $M_{\text{time}} = 55.17$  mins) were conducted online or in person. The FGs (80- and 75-minutes duration) were online. All interviews and FGs were facilitated by author JM, who had no teaching responsibilities with the institution. Students could review and withdraw comments collected.

## Data analysis

The LMS analytics data (i.e., system accesses, interactions, and grades) was examined using social network analysis (SNA). We do not aim to provide a comprehensive description of this methodology here but rather we present this approach to student forum analysis in an accessible and applied manner that is useful and practical for researchers and practitioners working within higher education. For those who wish to learn more about this approach, please refer to Faust (2010) for triadic census methods and Hoffman (2020) for code implementation.

SNA is an interdisciplinary technique commonly used in the educational literature to analyse such data (e.g., da Silva et al., 2019). SNA can ascertain the level of student interactions, the structure of relationships formed and their potential impact on learning (Grunspan et al., 2014). This is commonly done by a simple forum census (i.e., counting the number of posts); however, this approach only assesses participation, disregards lurkers, and does not provide detailed information on probabilities and expectancies. To fill these gaps and investigate lurking behaviour, we conducted a deeper analysis using triads, and a new innovative approach called hierarchical index analysis that author BH adapted from Hoffman (2020) and McDonald and Shizuka (2013). This analysis provided an assessment of the type of communities that students formed on the forum (i.e., hierarchical or egalitarian) and the relationships within those communities (e.g., reciprocal). Studies have used constructs such as transitivity weighting (McDonald & Shizuka, 2013) to represent the hierarchical structure; however, we have developed a hierarchical index based on a path scoring system we feel better captures hierarchical and egalitarian networks.

Student interactions were examined using triads (relationships between three students). Triadic analysis is more informative than dyadic analysis (two students) and more parsimonious than tetradic analysis (four students). Students were grouped by frequency of interactions which were depicted by three pathways (Figure 1). Pathways could be mutual, such as two students reciprocally interacting by posting and responding, asymmetric, representing a one-way interaction (e.g., a student posts but there is no response) or null being no interaction between students. These interactions within the triad are classified by the

number of these paths, such that a triad classed as 120 indicates one mutual path, two asymmetric paths and no null paths.

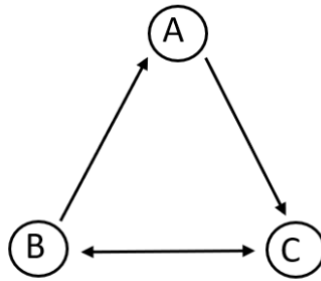


Figure 1. Representation of a triad

Note. A = Student A, B = Student B, and C = Student C. Lines = paths (interactions between students). B to C = mutual edge. A to B and A to C = asymmetric edges.

Triads were further described as transitive, cyclical, or intransitive. Transitive and cyclical triads have no null pathways. Intransitive triads have at least one null path. Triads are also indicative of hierarchical and egalitarian relationships. Hierarchical triads (usually transitive and intransitive) have unidirectional interactions with one student posting and the other responding. Egalitarian triads (usually cyclical) have bidirectional interactions with students both posting and replying; thus, for peer-to-peer relationships, egalitarian cyclical triads are desirable (Grunspan et al., 2014). While there are various other triads based on the number and types of edges, for this study, we classed those that demonstrated unidirectional relationships as hierarchical and those that were reciprocal as egalitarian. Figure 2 shows a sample of triad classes.

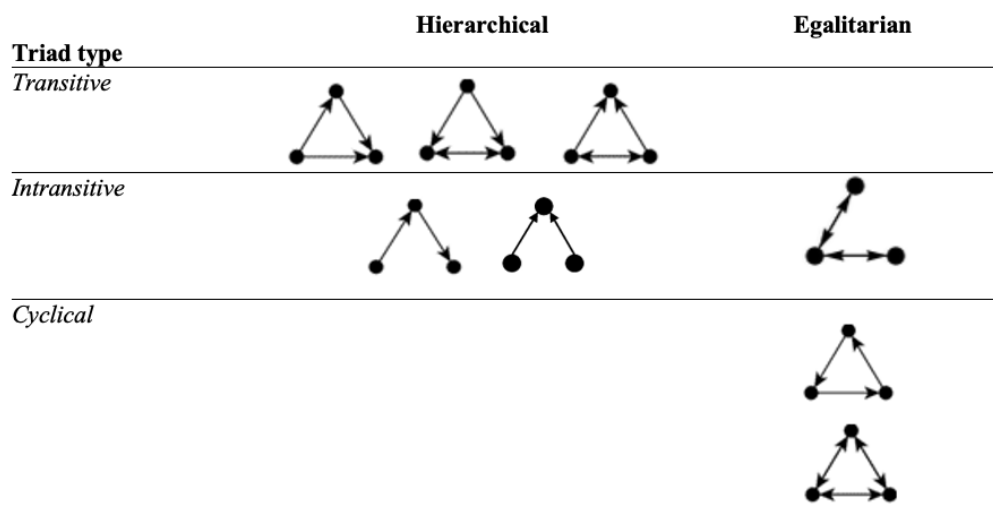


Figure 2. Hierarchical and egalitarian triads

*Hierarchy index*

A hierarchy index was developed that scored triads based on the number of null, unidirectional or mutual paths. Mutual paths are connected in both directions; that is, you could follow the arrows from node A to node B or from node B to node A (including paths through the third node C). Unidirectional paths are connected in one direction only, and null paths denote no connection between the two nodes. Null paths scored 0, unidirectional paths were +1 and mutual paths, -1. This index was the sum of those scores and could range from -3 to +3. This method of analysis provided a structured way to determine the nature of the interactions. To determine the statistical significance, these networks were compared to the triad distribution of 500 random networks (using Erdős–Rényi random graphs) that had the same number of nodes and density of the forums examined.

*Density, connectedness and transitivity*

Examination of the forums' density, connectedness and transitivity provided information on student engagement. Density is the simplest measure of a forum's busyness. Lower density equates to less activity, and this was assessed by examining the total connections (posting or reading) between students and comparing them to the possible number of connections. Connectedness, examined by average path length, is the degree of separation of the students. A shorter average path length indicates closer connections between students in the network. For example, a network that looks like a long queue of people would have a high average path length than a network that looks like a spider web. A higher value indicates that a small number of people controls the information flow; therefore, a more egalitarian forum where interactions are bidirectional would have a lower value. Figure 3 provides graphical depictions of density and connectedness.

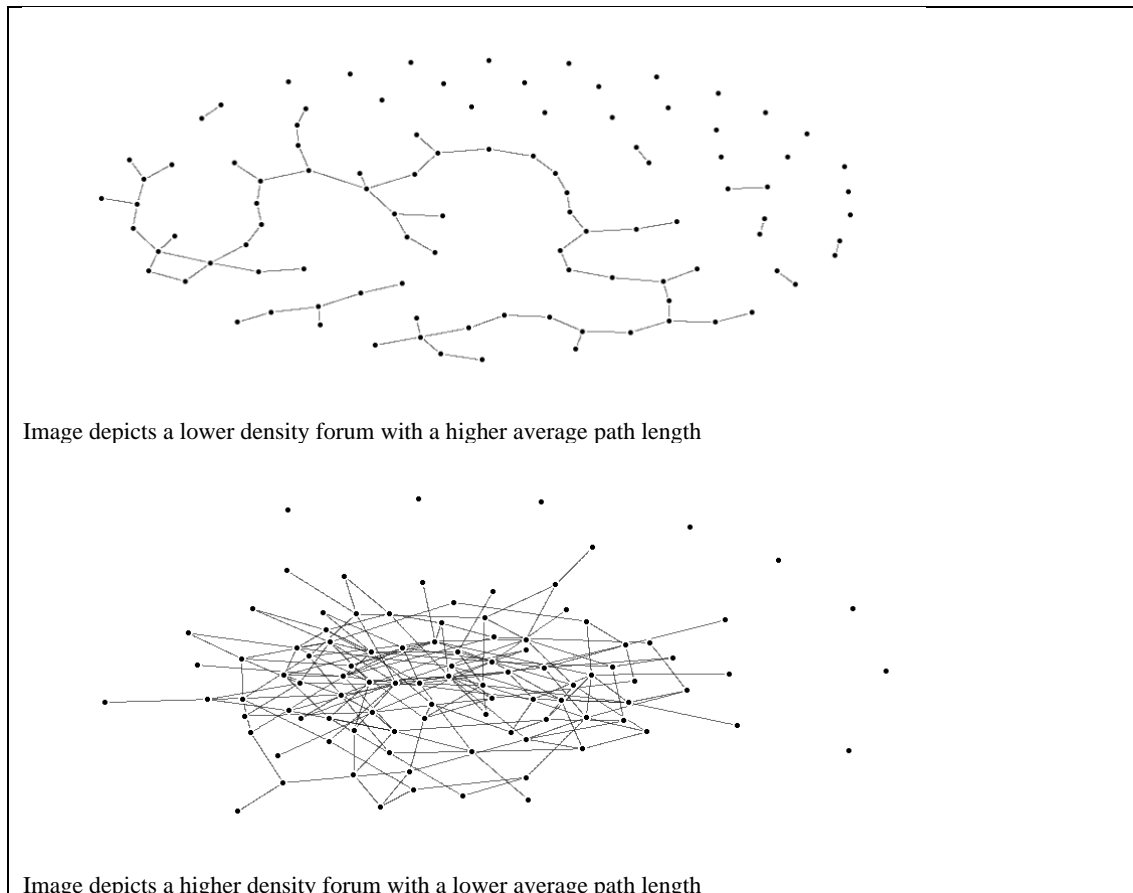


Figure 3. Examples of the density and connectedness of a forum

Transitivity is the probability that students will form closed triads (i.e., no null paths). Thus, if Student A interacts (i.e., responds to a post or reads it) with Student B and Student C, this is the probability that Students B and C have also interacted. Higher transitivity indicates a stronger tendency to form small groups. Examples of transitive and intransitive graphs are displayed in Figure 2.

*Qualitative data*

The audio recordings of the interviews and FGs were transcribed verbatim. In addition, each transcript was de-identified (pseudonyms are reported), proofread, and quality checked. This process also served as a process of initial familiarisation with the data (aside from the original interviews themselves).

A thematic analysis (Braun & Clarke, 2006) of the data was conducted by JM. This exploratory data analysis emphasised the participants' personal experiences, perceptions, and attitudes. Data was initially hand-coded, with transcripts coded individually and line by line (with each given equal consideration). A list of codes was generated, with each new identified topic added to the list. When a participant's data matched an existing code, the appropriate pseudonym was noted alongside that code. The data was then

imported to NVivo version 12 for electronic storage and organisation. The complete list of codes was reviewed visually mapped relative to one another (Braun & Clarke, 2006). Higher-level themes were constructed, as relationships were observed among codes; here, the aim was to define and refine the themes (Braun & Clarke, 2006) to ensure that they had internal homogeneity and external heterogeneity (Patton, 1990).

## Results

First, the characteristics of the discussion forums are described, followed by the SNA and qualitative findings. Both subjects had a main forum for general queries, assessment forums for questions/information on assessments, and social forums for informal peer-to-peer postings. In addition, Social Psychology used a tutorial forum where the students were asked to post about specific learning activities. Biopsychology had a weekly topic forum where students could initiate discussions on that week's topic. Discussion forum participation was voluntary for both subjects and not linked to any assessment or grades.

Both subject coordinators vigilantly checked and responded to posts, particularly to questions directed to them or to correct misinformation. For the tutorial or topic forums, the coordinators allowed some questions to sit for a day or two to encourage peer-to-peer interactions. A point of difference was that the Biopsychology coordinator used the social forum to facilitate introductions early in the subject (students were strongly encouraged to post introductions). By comparison, the Social Psychology coordinator used Padlet (a separate online platform) for introductions and did not utilise the social forum.

The proportion of forum usage to the overall LMS interactions was similar for both subjects. Biopsychology had 65,968 forum interactions representing 11.43% of the total LMS activity (577,341 interactions overall). Social Psychology had 20,907 forum interactions representing 11.86% of the total activity (176,346 interactions, comparatively). These interactions were based on clicks within the LMS and included those who did not post (i.e., lurkers). Table 2 presents the data on specific forum postings for each subject.

Table 2  
*Forum usage*

Forum	Social Psychology		Biopsychology		
	Total posts	No. of participants (% of cohort)	Forum	Total posts	No. of participants (% of cohort)
Main	154	29 (21.8)	Main	217	40 (29.2)
Tutorial	109	19 (14.3)	Weekly topic	240	37 (27.0)
Assessments	80	29 (11.0)	Assignment	271	43 (31.4)
Social	11	8 (6.0)	Social	123	64 (75.9)
<b>Total</b>	<b>354</b>			<b>851</b>	

*Note.* Social Psychology's assessments forum consisted of three sub-forums.

### Forums as learning communities

The hierarchy index analysed the forums as learning communities. This index was compared to a random unstructured community (indicated by the 90% error bars) to obtain expectancy figures. As shown (Figure 4), there were more egalitarian triads than hierarchical triads, indicative of both forums representing learning communities.



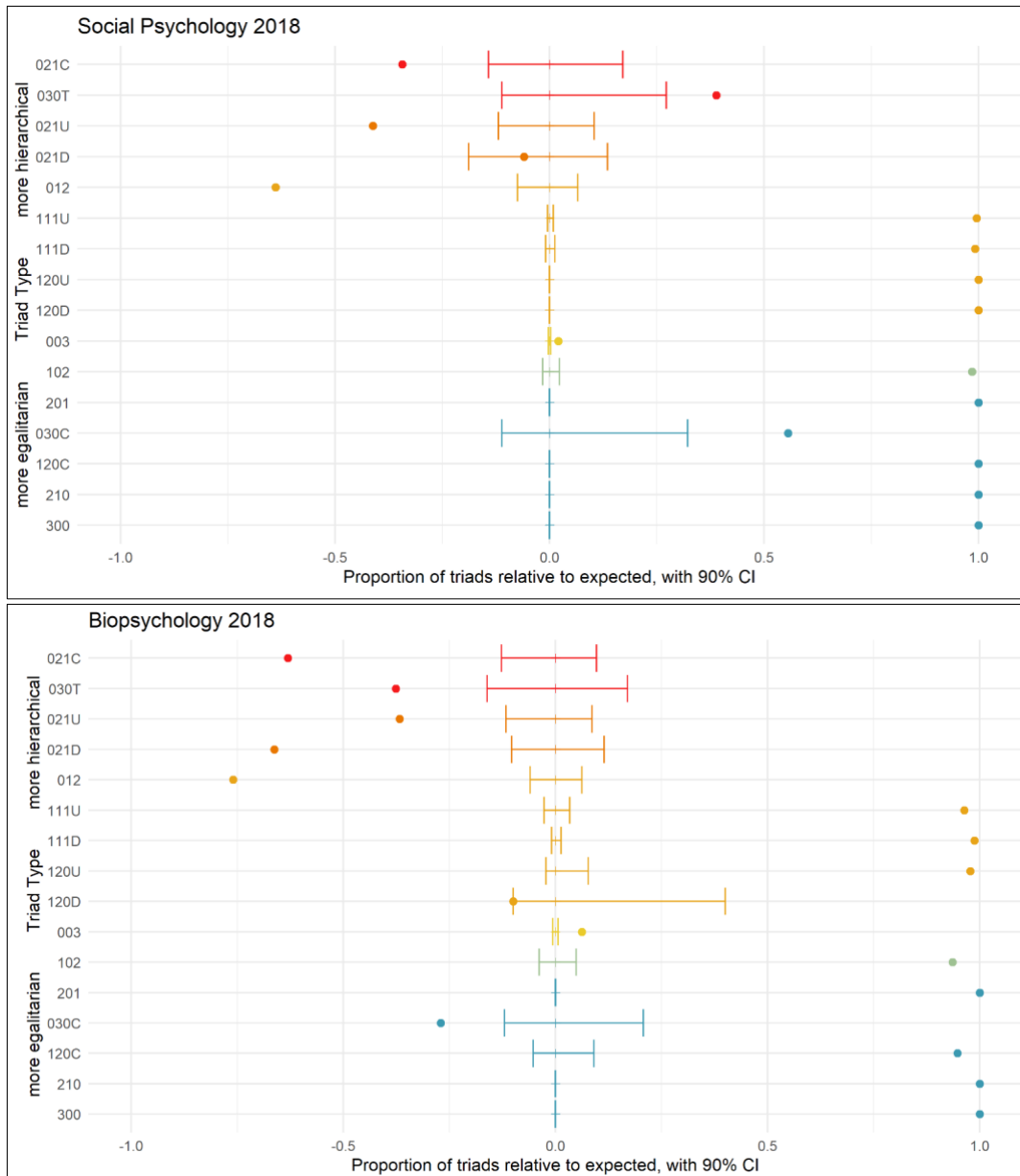


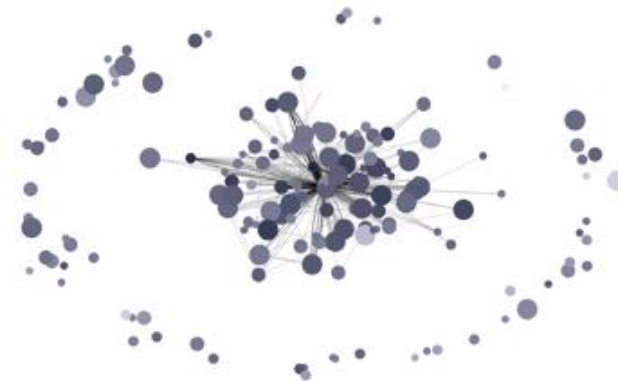
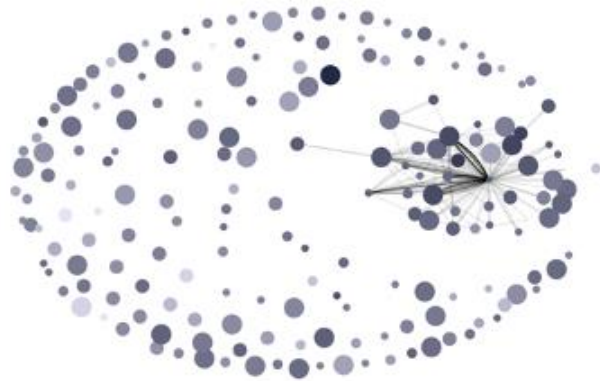
Figure 4. Hierarchy index of triads

Note. Colour indicates triad type: red-orange = more hierarchical, green-blue = more egalitarian. Dots indicate the triads in the forums; error bars denote the area of the null hypothesis; anything outside the error bars is significant. Dots on the right indicate a higher proportion of triads than expected. The hierarchy index is on the x axis, triad type on the y axis.

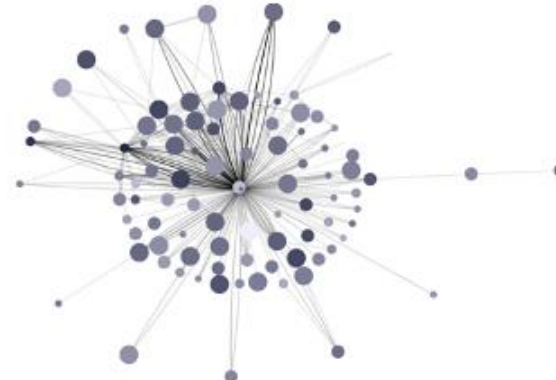
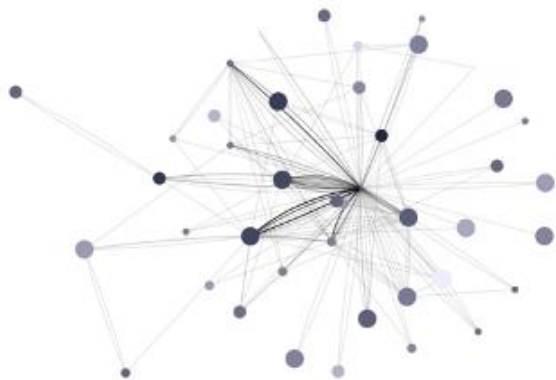
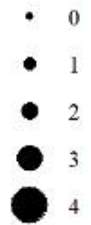
While the data above shows that both subjects had more egalitarian triads than hierarchical, indicative of reciprocal relationships, this does not mean that all students were active posters. Rather, many were vicariously consuming the content or lurking. This pattern of forum activity is visually depicted in Figure 5. Each dot represents a student, and each line is the sum of the posts between students; darker lines represent more posts or replies, darker dots indicate more forum accesses. Unconnected students (i.e., no line) were lurking. Grades are displayed in quartiles; the larger disc represents the upper quartile. Comparatively, Social Psychology had more lurkers than Biopsychology who had a denser cluster of triads centrally. Of interest is that for both subjects, the lurkers were a mix of grade bands, indicating that, despite their preference for lurking, they still achieved academically.

**Social Psychology**

**Biopsychology**



Grade Quartile



Accesses

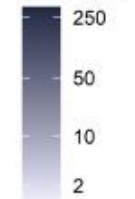


Figure 5. Forum network activity

*Note.* The lower images are a focused view of student only interactions with the isolated points removed. Note that the placement of the dots is arbitrary and presented this way for readability.

Lurking was a theme identified in the qualitative data. Students largely indicated that they did not personally engage in the forums by posting. However, participants were not supportive of these forums being removed from online learning. Many participants indicated that they do not want to contribute but prefer to lurk in the background and consume the content produced by their peers.

Forums are useful though I can't say I have utilised it to ask a question. I do read them though. (Ayda, FG2)

I found the same. I never actually posted anything, but I would always read other people's responses. [others laughing]. (Nira, FG2)

I do think there's lots of like creepers in the background like me, who watch it and keep an eye on it [Laughing]. (Tegan, Interview)

This raises an important point: teachers must be mindful of the various ways students choose to engage with content. A lack of forum posts does not equate to an absence within this space, just like a quiet student in a classroom is not completely unengaged. The analytic data showed many unconnected triads for both subjects (but fewer than what would occur by chance, see Figure 4), but this should not be considered indicative of unengagement. Rather, the qualitative data supports the notion that students are meaningfully consuming the forum content while not necessarily contributing.

The qualitative theme Checking Forums for Assessment Information suggested that checking forums for assessment information was a key motivator for keeping up with forum content. Students did not want to miss useful assessment information shared by the teaching staff or their peers. For many of these students, their tendency to read the posts but not contribute was evident:

I do check the forums for assessment. It's good to see the questions that other people ask. (Jane, FG1)

I am not big on the forums ... I chose not to check those a lot, unless it was a specific thing, say around an assignment or research report, what to include or something like that. (Rita, Interview)

I never used discussion forums, then I'd end up getting them and think "Oh shit! All these questions I didn't know the answer to and didn't put in my essay!" And then like, there are these discussion forums where it's already written for you, questions are already answered, and I think "that would have been so handy to know." So I guess they're fantastic for assessments and exams. (Violet, Interview)

I might be having some thoughts and read what other students have put up about a subject, and that's helpful, especially when it comes to assignments and that kind of thing. Um, I found that useful in that sense, you know, if I didn't want to put my own thoughts there but I wanted to see what other people are thinking. (Gabrielle, Interview)

This last quote, by Gabrielle, suggests some competitiveness and willingness to accept others' insights without contributing to the exchange of knowledge. Rather than serving as a space for discussion and meaningful development of knowledge and experience, it appears forums are used more for the short and pragmatic exchange of fact-based knowledge related to assessment requirements. This information exchange is not bidirectional as some students prefer to consume information without contributing, but regardless it is still indicative of engagement.

The qualitative data identified a key deterrence to contributing to a forum is Intimidation captured under that theme. Students expressed concern about how others might judge them on under-developed ideas, asking questions that were answered elsewhere, or their poor spelling or grammar. This tended to result in only stock-standard questions asked on the forum (e.g., how many references do I need for my assessment?); other questions were directed to the teacher via email. This indicates that students may have more concern about being judged by their peers than by the teachers:

If I had a question that I thought other students might think a bit odd or a bit funny or a bit dumb, I would go straight to the lecturer otherwise your normal run of the mill questions I'd put on the forum. (Della, FG2)

I'm quite self-conscious about posting on the forum and maybe asking a dumb question that's been covered somewhere else I just haven't read ... and if it's something that I can really relate to, like is something personal then I'll just email the lecturer. (Tegan, Interview)

For me, across all subjects, I think there was an element of intimidation. ... You had to upload your responses, that's a personal feeling of being a bit intimidated, not knowing if your response would be good enough, you certainly read some and think "Oh! I haven't even gotten to that yet", and I start getting overwhelmed before I even start the topic. (Rita, Interview)

Rita appears to view such forum tasks as simple demonstration of what you know or think about a topic. There appeared to be a minimal appreciation of the forum as a bidirectional source of information and knowledge development. For example, documenting your current understanding of a topic is useful because we can have the phenomenological experience of 'knowing' something, but explaining this to someone else in writing or speech is very different, and may highlight gaps in knowledge and logic that can be the focus of further development.

Even those who actively engage in the forum indicated that they experience some level of intimidation that must be overcome when using the forum:

I actually do get involved in the forum. I find online study really lonely and it's just me at home and a lot of hours that you don't get to bounce off anybody else very often. But I always felt really self-conscious. I think you get better at it the more [subjects] you do and depending on the [subject]. But I just have to just be like, "doesn't really matter what anyone thinks". I have to be really strong and not care, and try and worry about what you might think, because I find it really helps my learning if I've got a question I just have to ask it and the more I put in the more I generally feel like I get back. ... Even though I'm quietly sitting at home for half an hour before I actually submit that question. I'm thinking a lot and I'm self-conscious, but I just have to bite the bullet. (Sarah, FG1)

This level of intimidation may be indicative of students having difficulty internalising their success or capacity as a student. In some cases, this difficulty (known as imposter syndrome) may make them more likely to consume content than contribute.

## Student engagement

To assess engagement with forums we examined connectivity using transitivity (the probability that students will have closed triads); density (forum fullness); and connectedness (the degree of separation on the forum). As shown (Table 5), Social Psychology had a higher probability of transitivity whereas Biopsychology's forums were denser. Also, Biopsychology had greater connectivity between students with shorter path lengths and higher centralisation, meaning that the forum posts were not by the same few students. These findings indicate a degree of engagement (more closed connections and greater widespread dialogue).

Table 5  
*Forum density, transitivity, and connectedness*

Subject	Nodes	Density	Transitivity	Average path length	Centralisation
Social Psychology	190	0.006	0.18 (0.0-0.03)	2.25 (3.3-9.0)	0.03 (0.01- 0.07)
Biopsychology	166	0.016	0.06 (0.02-0.04)	2.22 (4.8-5.6)	0.24 (0.06-0.12)

*Note.* Nodes = all students who accessed the forum (posted and lurked). Expected value range in parentheses indicates the 90% simulated values. Statistical significance is shown by comparison to a random unstructured forum (our values do not fall within the 90% simulated value range which indicates the null hypothesis).

To further investigate the statistical significance of the forum activity we compared Biopsychology's structured forums to its unstructured social forum to ascertain if the structured forums were significantly different to the unstructured social forum. Both the structured and unstructured forums produced higher transitivity and centralisation than expected. The average path length was much shorter than expected in the structured forum. In contrast, the unstructured forum was within the expected range, indicating the structured forums had much closer groups on average than the unstructured forum.

Table 6  
*Structured vs unstructured forums*

Forum	Nodes	Density	Transitivity	Average path length	Centralisation
Structured	166	0.012	0.07 (0.01-0.04)	2.12 (5.9-7.6)	0.15 (0.08-0.17)
Unstructured	166	0.004	0.05 (0.00-0.03)	2.47 (1.7-3.8)	0.04 (0.001-0.006)

*Note.* Structured = all forum activity excluding social forum. Unstructured = social forum. Social Psychology's social forum had insufficient activity to make meaningful distinctions. Expected value range in parentheses indicates the 90% simulated values.

The above findings highlight the forum differences in the two subjects. The qualitative data provided some insights as to why there may be differences in the engagement profile across the two subjects. This included a pre-existing apprehension towards studying Biopsychology because of previous poor performance in science subjects consistent with the subject's content. Biopsychology covers content that is quite different to other psychology subjects:

I thought I would love Social Psych and wasn't sure about Bio, as I hated science when younger. (Laura, FG)

I failed human biology in high school, it's not my area and I was actually quite apprehensive about it. (Tegan, Interview)

I remember Biopsych from my undergrad and I had a little bit of trauma associated with it, just in terms of my mindset around the heaviness of the content, the terminology of it, the technical aspects of working with parts of the brain. (Rita, Interview)

I think Social Psychology was my first second-year subject because I was very interested in it ... the one that I'm a little more afraid of is Biopsychology, just because of the very long names. I'm afraid they won't stick in my head at all. (Caitlin, Interview)

This highlights an important point. Teachers should be mindful of their subject's content and how this might influence engagement in discussion forums. Indeed, participants highlighted the challenges of unfamiliar technical terminology, fact-based rather than theory-based content, and an inability to consciously experience many of the internal biological processes being taught as reasons they had to engage with the Biopsychology subject differently to other subjects:

Social psych had real world everyday examples you could put into use by simply going about your day. But Bio was difficult as finding out we all have D1 and D2 receptors isn't going to make people a better psych. (Liam, FG1)

It just felt like I was studying to be a doctor [others laugh] ... there was definite answers like [in] mathematics. (Kylie, FG1)

With certain subjects, like Bio or statistics subjects, the content is so foreign to what we're used to learning or reading ... with Social Psych you could sort of whiz through the book and get it pretty easily ... because it was relatable to everyday life. ... With Bio or stats, they might say eight hours [of weekly work on the subject is required] but really you might need 20 ... to really comprehend it properly. (Zara, FG2)

Certainly with the Social Psychology, all the experiments that you learnt about, you could try and practice on your husband [laughs]. ... I know that when I'm dealing with people I can apply certain aspects of the subject to what I am seeing with work and other things. (Gabrielle, Interview)

## **Discussion**

This study examined forums as learning communities, student engagement, and whether lurkers benefit from forums. Using new innovative techniques, we found that exceedingly, the communities students form within these forums were egalitarian suggesting reciprocal relationships with a degree of engagement with the subject content. We discuss the findings below for each research question.

### **To what extent do forums represent learning communities?**

The analytics data, that is the triads and relationships formed, support the notion that the forums were learning communities yet despite this, many students accessed the forums and consumed the content but did not interact. While students may have a common goal (a degree), and their consumption of forum content constitutes a form of engagement, the lack of reciprocal learning and interaction was not evident. Given this and Lave and Wenger's (1991) conceptualisation of a CoP as one with a common goal and reciprocal learning, we conclude that these forums do not represent these types of communities. This finding is inconsistent with other studies and demonstrates the important distinction between participation and engagement. Decker and Beltran (2016) found that students perceived forums as valuable opportunities for community building, but the prescriptive nature of the task meant they felt their posts were unnatural or forced. Yee and Ean (2020) found that students interacting with their peers in discussion forums contributed to a sense of belongingness and autonomy when they were perceived as safe online spaces. However, as supported by the theme Checking Forums for Assessment Information, the students in our study seemed to value the forums as an information source over a community.

Further supporting this notion is the differences in forum activity between Biopsychology and Social Psychology. Biopsychology had fewer closed triads than Social Psychology but a denser forum indicative of greater dialogue. This suggests that many Biopsychology posts were simple information exchanges (i.e., question and answer), which may be due to the preconceived, as well as observed, differences between the content in the subjects. These different types of posts (i.e., information exchange versus dialogue) may have contributed to differences in discussion forum engagement and limited the extent they represented learning communities.

Short exchanges like this are consistent with Morris and Stommel's (2013) community of commentary, but we liken our forums to a subscription service. Students who post on the forum produce the content for this service and others receive the content. This subscription community evokes very little discussion and is not characterised by a pattern of call and response which often describes discussion or dialogue (Dennen, 2008). Given our findings, we propose that the name discussion is a misnomer and may provide a perception of the forum that could have unintended negative consequences.

### **To what extent are students engaged with the subject forums?**

While these forums may not be a CoP, our findings indicate that students are indeed engaged. Both the analytic and qualitative data confirm that the students consumed content in the absence of visible evidence of posting. The visual depiction of the forum network activity (Figure 5) highlighted those described as lurkers located peripherally, seemingly watching. Traditionally, these lurkers were disregarded and considered unengaged as their presence and participation was invisible. This approach is inconsistent with engagement as a multidimensional construct (i.e., behavioural, affective and cognitive); students can engage on any level to effectively learn (Ben-Eliyahu et al., 2018; Sugden et al., 2021). Moreover, this approach fails to consider that forums are a virtual representation of a classroom. In the traditional classroom, some students do not actively contribute to discussions but still benefit from the discussion by consuming the information.

The term *lurker* originated from the early internet chat rooms and describes someone who observed but did not visibly interact (Edelmann, 2013). These observers were uninvited, giving the name “lurker” a negative connotation. This perception of lurkers, for some, has continued in the educational literature but, as Honeychurch et al. (2017) pointed out, lurking is not always negative in educational contexts. Indeed, our findings show that lurking is an educational activity by which some students engage with the content. We propose that these students who are on the peripheral or sit quietly in a classroom, are not lurkers but rather quiet participants. Referring to these peripheral learners with the more positive connotation of a quiet participant acknowledges their quiet engagement and participation.

The question arises though that the perception of being unengaged (i.e., not posting) can have negative consequences for academic performance and postgraduate outcomes. The forum and online subjects more generally could be the seeds where imposter syndrome is sown and flourishes post-graduation. As highlighted by Honeychurch et al. (2017), expectations, community norms and values are more important to increasing engagement than the online space alone. Therefore, educators should be mindful of how forums are used to reduce the risk of imposter syndrome. While we did not explicitly measure imposter syndrome in this study, our qualitative data supports this consideration. Moreover, given that this phenomenon is more typical of mature-aged students, consistent with our cohorts (O'Donnell & Tobbell, 2007), we make some tentative propositions in the absence of research literature on imposter syndrome, student engagement and higher education. Bozkurt et al. (2020) identified a lack of confidence and concerns of failure as two factors that may contribute to lurking. It is conceivable then that these factors, which are consistent with imposter syndrome and our qualitative findings, may contribute to a student's reluctance to visibly contribute to forums (Chapman, 2017; Clance & Imes, 1978). Future studies into imposter syndrome and online study will help to better understand this potential barrier to student success.

### **Do lurkers benefit from forums?**

The final question we sought to clarify is whether consuming forum content without posting benefits the student. Our findings that lurkers do indeed benefit academically from forums is consistent with Alzahrani (2017), although we additionally demonstrated that many quiet participants had high academic achievement. While we cannot propose a direct causal link between quiet forum participation and academic achievement, we demonstrated that silent participants can still achieve academically.

### **Practical implications**

While discussion forums have their place in online education, our findings present opportunities to transform them into dynamic and effective learning spaces. These spaces should ensure students feel safe to engage in any way they see as suitable and to know that consuming alone is acceptable. Notwithstanding this, this vicarious learning could have unintended negative impacts on their peers. A preponderance of students who do not post may discourage others from posting due to feelings that their posts are not read. Therefore, students knowing that others are reading their posts (despite not commenting) would be beneficial as it shows they are doing a service by posting their questions. We propose that LMS providers enhance their systems to allow readers to indicate that they like or have read a post.

We further propose that the name of the platform is a misnomer as discussion implies verbal or visible exchange and this perception may limit their application. For many in their current usage, forums are simply question-and-answer platforms, and we argue they should not be called discussion forums at all. Other platforms that provide more informal interactions (such as thumbs up, emojis, likes, or indicators that a message is read) would be more conducive to community building and may encourage those reacting, to post themselves. These indicators provide safeness and a visible indicator of engagement. Teachers also can manage expectations and lessen feelings of intimidation by setting the tone for the online spaces and how they should be used. For instance, Biopsychology used its social forum for introductions, and this may have served as an initial icebreaker that may have contributed to feelings of safeness or emboldened them to post more (i.e., initial exposure to posting in a safe space without an expectation to demonstrate knowledge).

## Limitations

Despite the overall strengths of this study being its mixed-methods sequential design and innovative analytic methods, the findings are limited by its cross-sectional nature. Further longitudinal studies will serve to clarify any causal relationships. Also, the study may have attracted those students with a vested interest, that is those with an interest in achieving academically and thus the sample may have been biased in this regard.

## Conclusion

We examined three questions in respect to discussion forums and found that in their present form they are not a CoP but rather online spaces likened to a subscription service. Regardless, given our findings, teachers can transform these platforms into dynamic teaching spaces by being mindful of the content and its influence on engagement, acknowledging that participation in forums takes many forms and facilitating a safe and inclusive platform that welcomes all types of interactions. This last point makes the important distinction between participating and engagement. That is, by understanding that engagement is multidimensional (i.e., some students may engage cognitively by reading posts but not behaviourally), students may not visibly participate. LMS providers who include visible indicators that posts have been read or consumed will assist in making these platforms more dynamic teaching spaces. Lastly, and importantly, we propose that given the negative connotation of the name lurkers these students be called quite participants.

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**Corresponding author:** Robyn Brunton, [rbrunton@csu.edu.au](mailto:rbrunton@csu.edu.au)

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