Asynchronous Posting and Reading both Reflect Communities of Inquiry

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Abstract

This descriptive case study explored the presence of a community of inquiry among 4492 secondary learners enrolled in four asynchronous online discussion forums over a full year. The forums (Ethics and Philosophy, Reading, Astronomy and Space, and General Debates, among others not studied) were external to the students' schools across England. The data had been archived by the sponsoring organisation. We coded 3,113 transcribed messages posted or read by students using Garrison's Community-of-Inquiry model and coding tools--addressing social, cognitive, and teaching presence within the interactions, plus 307 online questionnaire responses from a cross-section of participants about reasons for posting or not and overall participation plus representative quotes were also presented. Of the 4,492 enrollees, 1,523 (34%) posted messages, 1,748 (39%) only read or viewed posts, and 1,222 (27%) never logged in. This posting rate was almost quadruple the rate previously reported for online communities. Participation was also wider. The largest numbers of messages reflected community-of-inquiry social presence, especially following-up others' messages. Cognitive presence particularly reflected sharpening thinking skills and knowledge. Teaching presence included asking stimulating questions and providing encouragement. Students who only viewed others' messages logged in frequently, reported stimulation and strong benefits in learning skills, and only occasionally reported shyness or intimidation. Active student participation and engagement include more than posting messages; they also include reading or viewing others' posts. Community of inquiry was highly evident in the asynchronous, secondary, online setting. An asynchronous platform, with effective teaching presence, can support important qualities of a community of inquiry.

Keywords: Asynchronous online learning; community of inquiry; inquiry; collaborative learning; social constructivism; secondary learning

Introduction

The problem

Direct observation of teaching and learning is invaluable to understanding instructional processes, despite methodological challenges such as observer impact or participant behaviour while being observed (Everton & Green, 1986; O'Leary, 2020). It is difficult to directly observe teaching and learning in progress in a virtual or online setting, and especially so in an asynchronous environment. This difficulty equally applies to detecting active and inquiry-based instruction in these contexts. Such active, inquiry-based experiences can be expressed or evidenced in the development of a "community of learners" (Brown & Campione, 1994; Dewey, 1938) in the learning setting. When the learners engage in actions that support or reflect inquiry, then they become a community of inquiry or inquirers (COI).

Can a COI exist and be observed in asynchronous online learning? Demonstrating that asynchronous online environments and COI are compatible would broaden the image of inquiry beyond a "live" classroom or synchronous online activities to asynchronous and therefore more accessible situations. Nearly all prior research on this topic has been conducted in the domains of higher and adult education. The connection between asynchronous experiences and COI warrants exploration at earlier educational levels.

Research Question

What occurs as a COI within asynchronous online discourse among secondary learners over a full year of participation?

Importance

Theoretically, exploring the ability of an asynchronous online instructional environment to support inquiry-related learning, especially a community of inquiry, is important to discourse about virtual-learning compatibility with contemporary pedagogical practices in which inquiry-based learning and teaching play a central role. Most prior research has focused on teaching and a wide variety of learning outcomes in virtual learning (e.g., Gunawardena et al., 1997; Jiang & Koo, 2020; Sanders & Lokey-Vega, 2020). Also needed are detailed descriptions of what students actually do when engaged in active, collaborative, online learning, especially in different subjects over time.

Practically, the principal literature about asynchronous online learning predominantly addresses postsecondary and adult education. COVID-19 made virtual, hybrid, or online learning more widespread in higher education and elementary schooling in which inquiry-based instruction has gained acceptance more quickly than in undergraduate education. It is important to be reassured that inquiry and virtual learning are compatible. Our study isolated the question of COI applicability to asynchronous settings with benefits related to students' accessibility, cost, and learning needs and preferences. Combining synchronous and asynchronous approaches is good pedagogy, and studying teachers' actions is invaluable. However, we need to know more precisely where and how COI can exist and thrive. Asynchronous learning environments are technologically simpler and possibly less expensive to implement. There is also a skill needed to designing effective asynchronous learning modules. Equally important is the learner's disposition, attitude, and ability/skill to be self-directed. Educators could encourage these specialized skills more. Finally, there are advantages for research: Interactions and postings are often written, typically sequential, readily saved, and easier to analyse, plus the investigator is not directly present. Might the content relevance of the posting depend on specific discipline areas? Certainly, responding to essential questions or critical incident questionnaires are helpful…

Literature Review

Synchronous and asynchronous online environments have well documented strengths and limitations. Given the paucity of directly related research on COIs in asynchronous settings with pre-university learners, we specifically addressed just two issues in this review: the choice of a COI model and our focus on asynchronous learning. We preface those comments with some brief definitions.

Definitions of Terms

Synchronous

Synchronous events occur at the same time for all participants. They require presence in person, online, or some combination of the two (Zaatar, 2020). Examples include classrooms, online conferencing, lectures, webinars, break-out and discussion groups. Activities include highly participatory brainstorming, problem-solving, or decision-making, or relatively passive events such as listening to a presentation or watching a movie or videorecording.

Asynchronous

Asynchronous instruction does not require simultaneous presence or "real-time" participation, but can be participative through forums, email, texts, website or blog or social-media posting, or even watching a recorded synchronous event and separately commenting or engaging in dialogue with others. Asynchronous settings provide the required flexibility for learners to learn at their own pace, guiding them by providing additional learning responsibilities of inquiry and the technology.

Inquiry in Education

Inquiry is an approach to instruction built around social-constructivist theory of education (Dewey, 1938; Schell & Butler, 2018; Vygotsky, 1978). Key tenets are that learners create meaning for themselves, they especially do so when socially engaged with each other and teachers, dialogue is a critical part of that social process, teachers and learners add a wider variety of sometimes overlapping classroom roles, and the pursuit of learners' interests informs the curriculum (Shore et al., 2020).

Science education refers to this as learning the processes of science (National Research Council, 2000, 2012). Student roles, traditionally borne by teachers, include explaining, asking questions beyond clarification or course management (Walker & Shore, 2015), and seeking and evaluating evidence. Individual and small-group investigations and reports to authentic audiences are frequently capstones to inquiry learning. Inquiry varies widely in the extent of student responsibility for posing questions, answering them, and evaluating the process and product (Aulls & Shore, 2008). In international comparisons of educational attainment, jurisdictions adapting such curricular approaches (versus "back to basics") are frequently ranked higher (Irving et al., 2016). Postsecondary initiatives have pursued similar pedagogical paths (e.g., Boyer Commission, 1998), but progress has lagged (Boyer Commission, 2001; Prince, 2004).

Aulls and Shore (2008) distinguished among context and three other dimensions of inquiry: Our present focus was not the content of inquiry (what is learned about subject matter or inquiry itself), the process of inquiry (how to do or learn to do it), or the products of engaging in inquiry (addressed elsewhere, e.g., in Saunders-Stewart et al., 2015). Context refers to the situation in and with which participants engage (Cole, 1986). Asynchronous online discussion forums and communities of inquiry are such contexts. Their intersection, notably with secondary-age students, has been conjectured (Sanders & Lokey-Vega, 2020) but not empirically explored.

Discourse

Discourse is not simply conversation or talking aloud or thought. In cognitive and educational psychology, discourse--or dialogue--is verbal interaction connected to common purposes or goals (Swales, 1990). Vygotsky (1978) also envisioned self-dialogue, akin to working something over in one's mind.

Community of inquiry

The idea of community in educational processes extends to Dewey (1938); Brown and Campione (1994) articulated it as a community of learners. The idea has been articulated in different ways with regard to online learning settings. We identified and considered the merits of three different models in our search for one as a lens in our examination and description of asynchronous online discourse. A validated model provides a useful vocabulary with which to describe what is observed and a set of criteria by which to judge that a COI is present.

Units of Meaning Model

Henri's (1991) framework for analysing online messages involves coding part or all of each message in a transcript into one of five "units of meaning": participative, social, interactive, cognitive, and metacognitive. These are coded into categories or subcategories to evaluate computer-mediated communication for types of learning and thinking occurring online. The cognitive and metacognitive dimensions measure reasoning, critical thought, and self-awareness. Gunawardena et al. (1997) criticised Henri's model as problematic for incorporating the participative category within critical thinking. Identification of "units of meaning" contained ambiguities, even if they partly echo some qualities of inquiry, and the emphasis on critical thinking focused on individual rather than group or collaborative processes.

Interaction Analysis Model

Gunawardena et al. (1997) proposed analysing the interaction of an entire online conference to evaluate evidence for the social construction of knowledge. They postulated that the active construction of knowledge moves through five phase strongly echoing collaborative inquiry processes: (a) sharing and comparing information, (b) discovering and exploring dissonance or inconsistency among ideas, concepts, or statements, (c) negotiating meaning and co-constructing knowledge, (d) testing and modifying the proposed synthesis or co-constructing agreement, and (e) stating and applying newly-constructed meaning.

The coding scheme addressed cognitive activities (e.g., questioning, clarifying, negotiating, synthesising), types of arguments, resources supporting negotiating meaning (e.g., experiences, readings, new data), and evidence of creation of new or revised understanding from group interactions. Gunawardena et al. (1997) developed a model, based on these five phases, to analyse "the process of knowledge construction that occurs through social negotiation" (p. 400) in computer-mediated conferencing, typically synchronous events.

When participants in asynchronous discussion forums, separated in time and space, worked together to develop shared knowledge, the knowledge construction processes differed in the phases they reached. Gunawardena et al. (1997) used their model to analyse a global online debate and discovered this group had reached step (c). Another online learning network reached only step (a). The knowledge-construction process level reached depends on the purpose and design of each online community. This model has been utilised to assess postings in professional-development conferences. It was not developed in the context of online university or secondary instruction. In some cases the coding system did not provide adequate descriptors or indicators. This also made it difficult to apply in the present research.

Community of Inquiry Model

One of Gunwardena's (1997) co-authors, Anderson, collaborated in developing the Community of Inquiry (COI) learning model by Garrison and colleagues (Cleveland-Innes et al., 2018; Garrison, 2007, 2015, 2017; Garrison et al., 2000) that primarily addresses higher and adult education. It focuses on learning experiences and processes rather than outcomes or the technology itself. Early in the model's conceptualisation, Garrison's team developed tools to assess COI presence in computer-based settings (Anderson et al., 2001; Rourke et al., 2001a,b), initially asynchronous computer conferencing. Higher-education virtual-learning contexts now include synchronous and asynchronous experiences. Pursuing indices of effective online collaboration continues, for instance, Glassman et al.'s (2021) rating scale for collaborative efficacy. Developing instruments, however, is different from demonstrating the presence of collaborative communities, or understanding how they manifest in samples independent of those used during development. The COI theoretical model's generalisability is not widely explored either with pre-university learners or in synchronous or asynchronous settings alone.

The two most recent empirical studies linking COI to online teaching and learning focused on instructors, not learners. Sanders and Lokey-Vega (2020) reported a descriptive case study of four social-science teachers in one online, state-supported secondary school. Open coding of statements and planning documents revealed good fit of the COI model to the four teachers' observed work over 27 hours. Sanders and Lokey-Vega identified what they labeled collegial presence in interactions among teachers, consultants, and parents. Jiang and Koo (2020) studied 45 postgraduate educators. Comments and questionnaire replies revealed their previous online experience combined synchronous and asynchronous instruction, for example, live classes, email interaction with instructors, and student discussion groups. Their study focused on participants' online preferences. The COI model was again a framework; they did not assume or conclude that a COI existed. Generalisability of the COI model is not widely elaborated, although such potential has been postulated (Sanders & Lokey-Vega, 2020); the focus has been on what instructors do to create online instructional experiences more than learners' experiences.

The COI model created by Garrison and colleagues (Cleveland-Innes et al., 2018; Garrison, 2007, 2015, 2017; Garrison et al., 2000; Rourke et al., 2001a,b), was well summarised by Jiang and Koo (2020) and Sanders and Lokey-Vega (2020). It focuses on social-constructivist learning that specifies the interaction of social presence, cognitive presence, and teaching presence in the pursuit of the successful learning experiences. Each "presence" was elaborated and matched by a detailed coding template (Garrison et al., 2000; Rourke et al., 2001a,b), elaborated under Method (Appendices A, B, C).

Social presence is learners' ability to project themselves socially and affectively into a community of inquiry (Rourke et al., 2001a). It addresses patterns and types of participation and collaboration amongst participants and between student participants and facilitators. Its three subcategories are emotional expression, open communication, and group cohesion. It echoes Bandura's (2000) idea of collective efficacy also highlighted by Glassman et al. (2021).

Cognitive presence indicates construction of "meaning through sustained communication" (Garrison et al., 2000, p. 3). It has four subcategories: triggering events or learning challenges; exploration or information search in collaboration with others; integration or construction of meaning resulting from the exploratory phase--learners shift between reflection and discourse, often requiring teaching presence to move thinking processes forward; finally, resolution--ownership of the new learning, requiring opportunity for detectable application.

Teaching presence is intentional design, guidance, and encouragement of the cognitive and social processes, leading to meaningful learning of valued outcomes (Anderson et al., 2001). It is "teaching," not "teacher," presence because it need not be provided by the teacher, tutor, moderator, or facilitator alone, but by any COI member. Teaching presence comprises three subcategories. Direct instruction includes creating the overall learning situation, giving background information and related questions on the topic, summarising, clarifying, introducing supplementary material, plus assessment or feedback. Facilitating discourse supports understanding and sharing of meaning by asking appropriate probing questions, reinforcing participants' contributions, leading by example, and creating a warm, supportive, respectful environment. Instructional management addresses organisation, general rules, and instructions. All three invoke teacher immediacy or social presence as in face-to-face classrooms. A meta-analysis of 82 effect sizes from 30 studies conducted between 2003 and 2018 established a connection between COI teaching presence and students' learning and satisfaction (Caskurlu et al., 2020).

The three presences interact in pairs to facilitate the setting of climate, selection of content, and support for discourse. All three plus the paired intersections form the COI.

Although Garrison's model has been consistently presented within higher education (e.g., Garrison, 2017), its principal tenets came from social-constructivist educational theory grounded in elementary and secondary education (e.g., Brown & Campione, 1994; National Research Council, 2000; Vygotsky, 1978) and advocated in higher education (Boyer Commission, 1998). Nevertheless, Sanders and Lokey-Vega (2020) affirmed our recognition that "few studies have examined the applicability of the Community of Inquiry theoretical framework to the K-12 online learning setting" (p. 51).

The COI model was the most appropriate framework for analysis in the present study. After consulting one of the authors (Garrison), we decided that the model could be used with secondary students. Garrison et al. (2000) provided a detailed coding template complete with descriptors and indicators that made it possible to design the coding and analysis process. The COI model emphasises patterns and types of participation amongst participants and between participants and facilitators to ensure successful learning experiences.

The COI model enabled us to operationalise the research question: Are the three components of a Community of Inquiry (social-, cognitive-, and teaching-presence) observable in asynchronous discussion forums with secondary students? Because of the teaching-presence element it could also provide insight into if and how the presence of an expert or a teacher affected these relationships.

Focus on asynchronous settings

COVID-19 experiences uncovered technical and instructional challenges, and access issues, bringing classrooms home with synchronous learning. Many households have at most one internet-connectable device, so a learner might not be able to attend scheduled synchronous classes. Internet service frequently does not have adequate speed or bandwidth for one or more people to access

synchronous learning. As recently as October 2020, in the USA alone, "4.4 million households with students still lack[ed] consistent access to a computer and 3.7 million lack[ed] internet access. While more than half of households were provided computers from schools, a small fraction were supplied with devices to access the internet" (USA Facts, 2020), and "12.2 percent of respondents from households earning less than $25,000 a year said a digital device was rarely or never available for a child to use for learning and 9.8 percent said the same of the internet" (Collis & Vegas, 2020).

Beyond access, unequal participation challenges asynchronous learning. Nielsen (2006) reported that 90% of participants post no messages, 9% post occasionally, and 1% post nearly all the messages (on blogs, the numbers approach 95%, 5%, 0.1%). Format matters, and with younger learners the potential contribution from facilitation is evident. Some learners--variously labeled reader, viewer, witness, invisible, silent, vicarious, low-visibility, or lurking (an unfortunately judgmental label)--prefer to initially engage quietly from the sidelines in an authentic task. Although learning occurs in this mode (Beaudoin, 2002; Herrington et al., 2003; McKendree et al., 2003; Nonnecke & Preece, 2003) relatively passive participation might lead to suboptimal outcomes. Learning is not solely about subject-matter, but also "the creative cognitive process of offering up ideas, having them criticised or expanded on, and getting the chance to reshape them (or abandon them) in the light of peer discussion" (Rowntree, 1995, p. 207).

Method

Research Model and Procedure

This descriptive case study (Creswell, 2007) of four asynchronous online discussion forums (AODFs) included examination of 3113 posts in search of a community of inquiry, that is, the social and cognitive context that supports inquiry experiences. Qualitative studies and cases illuminate context phenomena in their natural settings (Creswell, 2014). Yin (2003) defined a case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context" (p. 13), and that draws upon "multiple sources of evidence, with data needing to converge in a triangulating fashion" (p. 14).

The enrolment was 4493 secondary students (described in more detail below). As anticipated by Nielsen (2006), not all enrolled students posted messages, leading to the difference between those two numbers. We explored this distinction. The forums were extracurricular activities organised independently of the school curricula. We had complete transcripts from 12 months (March, 2005 to February, 2006) of student and facilitator interactions, and questionnaires completed by 307 students after the forums were completed. Interactions were examined for evidence of a community of inquiry. We used three kinds of triangulating data.

First, we coded the 3113 posted messages using the predetermined codes in the COI model (Garrison et al., 2000). In an asynchronous setting, the most accessible data are discourse among participants. The most frequently assigned codes were tabulated and summarised with descriptive statistics, overall and for each of the social, cognitive, and teaching presences of the COI model. These first data provided an overview of the presence and extent of a community of inquiry within the model's frame of reference.

Second, we selected examples of participants' open-ended statements from the transcribed postings. These data provided insight into the nature of participation based on students' lived experiences, in their own words. The coded transcripts and participant statements captured data only from students who posted forum messages, hence could only inform us about the existence of a COI among students who post messages in an asynchronous forum.

Third, to understand if and how a COI extended beyond those who posted messages, 307 questionnaire responses to fixed questions addressed why students posted or not, why those who did not post read others' posted messages, and what overall personal benefits participants felt they received from participating in either way. More details are provided below regarding these questionnaires and the respondents.

The forums were not offered by a school or school district, and the study was not conducted in a school setting. The students were enrolled in schools widely dispersed around England and did not know each other before joining the forums. They registered individually and did not share common classroom experiences; therefore, they were not engaged in a "hybrid" experience and did not encounter each other outside the online setting. The data were obtained in 2006 from the National Academy for Gifted and Talented Youth (NAGTY) (National Academy, 2020) at the University of Warwick, England. NAGTY existed from 2002 to 2007, and was disbanded following government policy change. Students qualified in the top 5%-10% in statutory National Curriculum tests or other national qualifications, school-by-school. Participants were therefore largely university-bound and similar overall to tertiary students most common in past COI studies. Also, participants expressed themselves competently, and were interested in the relatively scholarly content of the forums. Independently supplementing school-based experiences, online communities created a less-structured space that enabled potentially isolated secondary-school-aged individuals to connect with others like themselves (Ng & Nicholas, 2007).

NAGTY shared their archives on condition of complete anonymity; no personal or confidential information would be released. All participants and their families gave assent and consent, upon enrollment in AODFs, that their interactions would be retained in written form and used for research. They were informed of all specific use and enabled to opt out. All names and potentially identifying information were removed (e.g., locations, URLs, embedded identifiers such as email addresses, signatures, photos), and we searched every quoted excerpt on the internet to ensure it was not posted elsewhere. Because of the academic nature of the forums, data were not sensitive. All names here are pseudonyms. These anonymised and previously unpublished data were revisited for this study. Access to these data and their preservation also constituted a fleeting opportunity. The difficulty and costs of reproducing such data anew would be nearly prohibitive.

Generalisability was constrained, however; our goal was to understand a phenomenon and a process, not achievement or abilities. Such identification did not consider cultural diversity, able underachievers, personal and social qualities, skills such as leadership and communication, or the range of conceptualisations of giftedness (Sternberg & Davidson, 2005). Nonetheless, these participants provided unique insight into what happens in AODFs and the potential for COI to flourish in asynchronous settings.

Forum posts were supplemented by an online questionnaire (Appendix D), designed while initially coding the archived messages, to answer questions emerging about participation. Three questions addressed reasons for reading and posting, two addressed community membership, and one each addressed meeting needs of being gifted (not of central concern here), facilitators' contributions, and which forums they were in. Each section and the questionnaire overall invited open-ended comments. The questionnaire was sent (with requests for consent and assent) to all students who signed on and posted or read in the first three forums, and a stratified (by demographics) random sample of 20% of the fourth and largest. From 991 invitations, 307 (31%) completed it. This sufficed to answer broad questions about participation.

Research context and sample--the forums

The AODFs were on Ethics and Philosophy (423 students, 68%/32% female/male, mean age 16.0 years), Reading (652 students, 76%/24% female/male, 15.5 years), Astronomy and Space (786 students, 52%/48% female/male, 15.0 years), and General Debates (2632 students, 54%/46% female/male, 15.5 years). Fewer than 1% declined to participate; their data were omitted. Fifty-one (1.1% of 4493) did not remain all year.

Ethics and philosophy

Each month the facilitator posted a Question of the Month (QOM) with general background information. Gradually, participants suggested topics. Appendix E lists each month's topics, 12 facilitator's suggestions in regular font, 14 students' in italics, with the numbers of posts and views.

Facilitator QOMs and related posts received the most sustained engagement, therefore the 509 messages responding to these (of the 772; 65%) were coded. There were 2891 views.

From September to February, the tracking system changed: The numbers of "views" and "reads" were generally equal. From March to August the number of reads was likely lower. This discrepancy applies to all four forums. Participants referred to "reading" posts. We used both terms as warranted by the situation.

Reading group

Two books-of-the-month were assigned by the facilitator from a list suggested by forum members. The facilitator usually initiated discussion with leading questions. Appendix F shows the 24 book titles with the numbers of posts and views; all 1052 messages were coded. There were 2162 views.

Astronomy and space

The facilitator posted almost-monthly topics with general background information. These 10 plus the Welcome and Suggest-a-Topic threads are displayed in Appendix G with the numbers of posts (537) and views (45). All 537 messages were coded. This forum paused in June and July.

General debates

In this forum, participants could discuss any topic (see Appendix H). Messages were moderated, but no facilitator kept the discussions alive. In regular font are the 13 topics (of 45) and 1015 messages coded (of 3245; 31%). Due to large enrolment and many messages, one strand from each was arbitrarily chosen from the first eight months, plus three from the following January (there were none in December or February, but extras in January).

Data analysis--coding asynchronous messages

Initial *a priori* COI categories, codes, and examples for the social-, cognitive-, and teaching-presences were summarised in Appendices A, B, and C. All three appendices were adapted from Rourke et al. (2001a). Social presence was coded for four Affective, six Interactive, and three Cohesive qualities. Cognitive presence was coded for two kinds of Triggering Events (Evocative), six types of Exploration (Tentative), four of Integration (Provisional), and three addressing Resolution (Committed). Teaching-presence codes included one each for Direct Instruction (Instructional Management), Facilitating Discourse (Building Understanding), and Instructional Management--Design and Discourse (Organisation, Direct Instruction). While coding, some COI codes included meaningful parts, so these were added during coding as needed, using Bloom et al.'s (1956) and Krathwohl et al.'s (1964) taxonomies of cognitive and affective educational goals as guides for labels and descriptions. The final 69 codes form Appendices I, J, and K.

Posts in their original chronological threaded format, categories, and codes were imported in Rich-Text-Format into the qualitative data-analysis package MAX_{QDA} to generate a searchable database. Entire messages were the unit of analysis. Posts varied extensively in length so up to three codes were assigned to each.

The first author with a colleague practised coding 100 random messages while discussing each, then independently coded all 125 messages in the "What is Betrayal?" thread (Ethics and Philosophy). Intercoder concurrence on 106 code assignments was 85% (see Appendix L). Noncodable posts included general information such as announcing breaks, scheduling, and other management issues. Given the numerous messages, 85% agreement was adequate to reliably detect COI elements in the exchanges. The first author completed coding the 3113 posts. Consistent with the descriptive nature of the study, analysis of the results was at a descriptive level of statistics sufficient to document the substantial presence of the phenomena of interest in the learning context.

Results

COI presence revealed in coded asynchronous messages

Frequencies for all assigned final codes are shown in Appendices I, J, and K. Table 1 presents the most frequently assigned codes for all messages posted, then separated into the three "presences" in the COI model. The overall assignment of codes to the posted messages reflected the existence of a community of inquiry in the asynchronous setting. Overall, just four codes (in column 2) accounted for 55% of the codes assigned; these four included three most frequently used for each presence plus #2 for one. Nearly all available codes, 65 of 69, were assigned at least once. At this most general level, participants listened to and built upon each others' contributions, expressed their own opinions, revealed important information about interests and experiences, and were guided by leading questions.

Table 1: Most frequent message codes assigned as Indicators of a Community of Inquiry (COI).

	All COI Messages	**COI Social Presence**	**COI Cognitive Presence**	**COI Teaching Presence**
Codes Used Most in Order of Frequency (*n*)	1. Quoting from another participant's message/ continuing a thread (232) (Social Presence #1) 2. Expresses opinion/views--own view (I think/I believe/in my opinion) (189) (Cognitive Presence #1) 3. Self-disclosure/general revealing fact (139) (Social Presence #2) 4. Asking leading questions (132) (Teaching Presence #1)	1. Quoting from another participant's message/continuing a thread (232) 2. Self-disclosure/general revealing fact (139) 3. Referring explicitly to others' messages/providing an answer (95) 4. Emotions (77)	1. Expresses opinion/views--own view (I think/I believe/in my opinion) (189) 2. Disagreement with other's message + own views (81) 3. Disagreement with supportive argument + comments taking discussion forward (75) 4. Agreement with other's message + own views (75) 5. Triggering events/sense of puzzlement (71) 6. Connecting ideas from various sources (58)	1. Asking leading questions (132) 2. Encouragement (86) 3. Answering someone's question directly (68)
Number (%) of Total Messages in Most Frequent Code	692 (22%) of 3113	543 (53%) of 1031	549 (68%) of 812	286 (72%) of 397
Number (%) of Codes Used and Available	65 (94%) of 69	29 (94%) of 31	27 (93%) of 29	9 (100%) of 9

Most-frequent codes assigned within social presence showed that self-disclosure and emotional statements were also common. The fifth most frequent code (assigned 44 times--asking questions from community members) was a large gap below the top four. Participants reacted more often to each other than they posed questions to each other. The six cognitive-presence codes accounting for two-thirds of code assignments were combinations of evaluations of others' contributions and integrating and restructuring that information with their own knowledge. These processes were a good fit to social-constructivist conceptualisations of how learning occurs in collaborative inquiry. The next highest frequency (39 messages--sharing/adds to knowledge based--shares, compares, facts) was consistent with actions coded in Table 1. The most common teaching-presence codes reflected teaching as guiding and motivating, not just being the source of information. The next two highest code frequencies (49--background information about topic and expectations and 19--summarising arguments and asking more leading questions) were consistent. Perhaps not

surprisingly for older adolescents, given the importance of social connections in their lives, 46% of the codes were assigned as part of social presence, 37% cognitive presence, and 18% teaching presence. Student participants' messages appropriately predominated; the teaching role was nonetheless present as intended.

COI presence in message content

Coding the transcripts of messages posted using the COI model as a framework provided one standardised source of evidence about the presence of a community of inquiry. Examples of student messages helped understand the nature of the data in the transcripts, especially the richness of the interactions, and provided further insight into COI in asynchronous-forum participation.

Social presence

Compliments were frequent. Rick commended Ethan for raising a good point in a debate; Ethan was delighted:

> I made a good point? At last! Knew if I made enough points, one would be good eventually! (Ethan, Ethics and Philosophy)

Students directly solicited feedback from each other:

> I hope everyone can follow this--it's a bit of a warm up for my PPE interview next week! I'd love to hear people's views. (Ena, Reading Group)

Being able to disclose personal information reflects growing relationships, an important part of social presence:

> I've wanted to be a writer for years but I really can't think of how to explain what it is I admire about Hardy's style. I think it's the way he creates such a relevant setting and the atmosphere with all the description. Language analysis is something I have a real problem with at school so I love Hardy but don't know why? (Henry, Reading Group)

> Well I picked it up in Waterstone's and read the first couple of pages before feeling guilty and putting it back on the shelf because I hadn't got any money. You'll probably say "get it out from the library" or something but the library van leaves just as I get off the bus after school on Tuesday and every time I go to my local library I get glared at by old people as though I'm going to mug someone. (Jane, Reading Group)

As members perceived the community environment to be safe and friendly, it became a place where they could complain about teachers, inadequate provision at school, other students not understanding them at school, and about community difficulties:

> Hi everyone, I'm Sandy, I'm very interested in space and how it works, but we never get to learn about it at school. (Sandy, Astronomy and Space)

Janice used the word "astrologers" instead of "astronomers"; the moderator wrote, "I sincerely hope you meant 'astronomers.'" Another student sensed that this might discourage Janice and immediately showed caring support with both humour and empathy:

> She probably did. And if she didn't *stares at night sky*, [mystical voice\] Jupiter and Mars can be seen aligned through the cloudy and polluted London sky so I predict that you won't be mean to Janice. (Stanford, Astronomy and Space)

Mutual support frequently occurred across multiple posts. Eliza was frustrated downloading software needed to process images in the Astronomy and Space forum. She asked for help.

> When I opened it, it came out as a script/code as well, and it wouldn't open in DS9 either, even if I did "Save Target As". So, I saved it as a fits file as normal with the Save Target As and opened it up in IRIS. It worked! So I hope it works for you lot too! Hope it helps. (Joe, Astronomy and Space)

Eliza replied, “It works for me in IRIS. Thanks Joe!” Then Maggie requested help with her attachments and Eliza came to her aid: “Try converting the file to a JPEG.”

There were also tensions from disagreements, followed by relief at a positive follow-up:

> It is good to get messages that agree with/add to my opinion or compliment something like my poetry too. (Fay, General Debates)

Cognitive presence

Learners engaged in several meaning-creating processes. Georgina expressed her own views after examining what others already posted on “Is violence ever justified?” She then added the following comment which showed her confidence and willingness to accept other views:

> Hope I didn’t offend anybody? though I’m glad if what I say makes you think again about things. I hold fairly strong views? but I feel this is justifiable because I have thought a lot about some of these subjects, have read fairly widely about them, and most importantly, subject my thoughts to regular criticism. If somebody presents an alternative theory which I feel is more likely to be true, I will certainly accept it. (Georgina, Ethics and Philosophy)

Many other interactions showed how other participants’ views were helping shape ideas:

> I think I’m beginning to see it now.... Is it that because the brain patterns cannot be predicted they aren’t subject to determinism? If this is the case though, what is the agent which carries out the conscious choice? (Mike, Ethics and Philosophy)

> Tricky stuff, I’ll come back to this later when I’ve read other people’s ideas. (Joanna, Reading Group)

Students shared extended, high-level reflections. This partial post illustrates an effort to understand the actions behind relationships among characters in *Far from the Madding Crowd*:

> Could this help to explain why Bathsheba’s relationship with Troy wasn’t very successful? Although, why does she fancy him so much and not Gabriel?
>
> I think it’s certainly the reason Hardy portrays as the failure of Bathsheba’s relationship with Troy. As for why she fancies Troy more than Gabriel at first is clear; Troy is good looking, dashing, obviously a womaniser and can flick a sword around in an impressive way. In comparison, Gabriel is rather dull and steady which makes for the better relationship but isn’t so interesting. A large part of the reason for Bathsheba’s initial attraction to Troy is lust which she interprets as love.

And as an afterthought...

> What’s also interesting to note is that Bathsheba’s vanity, a characteristic that Gabriel detects from the onset, plays right into the hands of Troy who almost instantaneously comments on her beauty thereby catching her attention (and causing Boldwood to lose out as he’s never told her she’s beautiful). Gabriel on the other hand is not afraid to criticise or speak openly to her. (Sara, Reading Group)

Teaching presence

The tutor’s response to Sara probed with additional thoughts and questions, and offered a transition to teaching presence:

> It certainly does seem as though we’re meant to compare Bathsheba’s suitors and review their “suitability” for her. Were you glad that she got together with Gabriel in the end or does it mark the end of her independence? Maybe we ought to think a bit about fate. You say that Bathsheba’s vanity means that she “plays right into the hands of Troy.” Does she have control over her

> actions or do circumstances (and other characters) conspire against her? I mean, does she herself bring about all the misfortune amongst the characters or does it just kind of "happen"? And what about Fanny? When Gabriel first meets her he feels her hand which is described "beating with a throb of tragic intensity" (Ch. 7). Does Fanny have any control over her life? Or could she be seen as the novel's ultimate victim? (Tutor, Reading Group)

Teaching presence also included students reaching out to facilitators, even reversing teaching-evaluation roles:

> Hey Richard, nice introduction to black holes. I heard that there was a black hole at the centre of our galaxy, so I went off Googling and found some really interesting information about it as well as some pictures and even a movie showing it. (Bob, Astronomy and Space)

Modelling and scaffolding were frequent tutor actions. The Ethics and Philosophy tutor modelled her thinking about determinism:

> Anyone who claims a certain racial group will all be predisposed to act or behave in a certain way is making some recourse to biological determinism. One example could be Hitler's assault on the Jewish people, certainly.
> I, myself, am not a big fan of determinism. But I seem to be in the minority...I think one of the reasons is that so many issues come under the idea (as my last post indicated).
> For instance, I may have moments where I believe in fate, that something was "meant to be", but I equally abhor the idea that every movement I make is somehow determined in the same sense as a rock will be frozen if you drop it in liquid nitrogen.
> In other words, we might have faith in some vague supernatural power affecting things occasionally (that you meet your future partner by running into them with your car) but this is nothing like scientific determinism. Arguably I am free as a human to make choices and take paths.
> But there is a deeper point here: *if it is all determined and free will is an illusion, then that doesn't matter to me*. Why?? well, my life plays out on the *human level, the experiential level*. One day a scientist might tell me the entire world is utterly different to how I think it is. But will I care? Well, perhaps not...
> Or, you might say hold on, I don't care about that "something or other" I can't ever, in principle see, and am quite happy with my everyday experience.
> See the idea? (Tutor, Ethics and Philosophy)

Participants were often encouraged to take the initiative and post their own questions, but this invitation was not frequently taken up:

> Hey! You shouldn't feel like you have to wait around for Georgina or I [sic] to post questions. It would be great if you came up with your own as well. They'd probably be far more inspiring.... But I'm glad you like the book and I hope you've got some thoughts on the questions I've raised above. (Tutor, Reading Group)

Two kinds of active COI participation

We anticipated regarding posting messages as active participation, and just viewing or reading as nonparticipative. However, features of the posts challenged this view--the proportion of viewers-only (39%) appeared low and many viewers returned frequently to the same threads. Questionnaire responses ultimately confirmed viewers' active engagement.

Frequencies of posts versus views are in Appendices E to H. In Ethics and Philosophy there were 772 posts and 2,891 views (27%), 1,052 versus 2,162 (49%) in the Reading Group, and 3,245 versus 10,996 in General Debates (30%). Astronomy and Space reversed the pattern with 537 posts but

45 views-only. Overall, given 5,606 posts in our data set (of which we coded 3,113) and 16,094 views, the posts-to-views proportion was 35%. Beaudoin (2002) reported a similar number in his college-level study. This was nearly quadruple the 9% reported by Nielsen (2006), suggesting that a community of learners had emerged. These proportions of views to posts ignored, however, who was posting, viewing or reading, or not logging-in.

We assumed that, when a member logged-in to a thread, he or she would read something. The software tallied participant log-ins and views by thread. When focused on the participants (Table 2), not just the posts and views or reads, the proportions of readers to posters were much closer in all forums. Only 27% registered for forums but never logged in, more strongly suggesting that the activity was interesting and a community had formed. There was considerable active participation across all forums, albeit more viewing than posting. We further explored this distinction raised in the literature and evident in our data, to find out if it helped us better understand the nature of a community of inquiry in an asynchronous online forum.

Table 2: Frequencies of Posts, Views, and Zero Log-Ins.

Forum	Enrolled	Posted And Viewed	Only Viewed	Total Active	Never Logged-In
Ethics and Philosophy	423	130 (31%)	184 (43%)	314 (74%)	109 (26%)
Reading Group	652	303 (46%)	217 (33%)	520 (80%)	132 (20%)
Astronomy and Space	786	247 (31%)	287 (37%)	534 (68%)	252 (32%)
General Debates	2,632	743 (32%)	1,060 (40%)	1,903 (72%)	729 (28%)
Overall	4,493	1,523 (34%)	1,748 (39%)	3,271 (73%)	1,222 (27%)

Posting

Were posters and viewers both part of the COI? Forum transcripts reflected only posters. Questionnaire replies provided insight into why students claimed they posted or not. Some questions permitted multiple replies and not every question applied to every responder, therefore we reported the percentages of choices (not students) for each option--this applies to all data under this next heading. In descending order of frequency, students selected the following comments about why they posted (Table 3).

Table 3: Participants' reasons for posting.

% Selecting	Reason Selected from Among Questionnaire Choices
65%	I enjoy getting messages that challenge my opinions.
51%	As I write I find myself thinking more clearly than when I speak.
41%	The process of posting helps me to learn to think and write carefully.
40%	I find it easier to state my views in the online environment compared to face-to-face discussions.
38%	I get discouraged when my message does not get any response.
30%	I do not care if anyone replies as long as I get my opinion across.
14%	I often discuss with others (friends, teachers, in class, family) before I post.
7%	Other

Enjoying challenges to their opinions reflected strong social presence. The next two reasons prioritised cognitive presence in sharpening thinking skills, closely followed by greater comfort in the online environment.

Participants' open-ended questionnaire comments complemented these reasons for posting with additional insights such as adding confidence, encountering and welcoming encouragement from peers, and finding the experience pleasurable:

- "Posting has helped me learn to think about issues more completely and has given me more confidence with regard to face to face debating." (Lydia, Ethics and Philosophy);
- "Writing a post helps me define and examine my own views on the topic. (Dawn, Ethics and Philosophy);

- "It is good to get messages that agree with/add to my opinion or compliment." Felicity, Reading Group)
- "Helps to organise your ideas so speaking is easy." (Manny, Reading Group); and,
- "Being part of the discussion forums and posting regularly means I feel happier as I have got friends in the online community." (Jake, Astronomy and Space).

Viewing (without posting)

We approached viewing from two perspectives: Why not post?--the proverbial cup half-empty, and Why view?--the cup half-full. Students who did not post selected the following reasons from the picklist (Table 4).

Table 4: Reasons for not posting selected by participants who did not post.

% Selected	Reason Selected from among Questionnaire Choices
58%	I feel that I don't need to post.
31%	Other (please specify).
30%	I feel intimidated by the messages already posted.
15%	I feel intimidated because of the large audience.
9%	I am too old compared to others on the forum.
5%	I am too young compared to others on the forum.
1%	There are too many female contributors and I am a male.
1%	There are too many male contributors and I am a female.

Over half (58%) the viewers were satisfied with the benefits from just viewing--the cup half-full. Two midrange replies were negative, feeling intimidated. Although a minority response, it signalled the importance of sensitive teaching presence. Open-ended and numerous "other" replies added further insights, such as views having already been expressed, being too busy and forgetting to come back, and technical problems (heavy or slow message moderation, interface difficulties, and insufficient computer skills).

Power and control were mentioned. Some participants were more confident, appeared more knowledgeable, and were assertive. A few participants felt excluded, alienated, disconnected, even unsafe. We chose the following representative comments from the open-ended remarks students shared at the end of the online questionnaire (these could not be re-associated with specific forums). Because of the geographic dispersion of the sample, the extracurricular nature of the forums, and students' individual enrolment in the forums, the references to cliques or friendship groups--one student called them "daily users"-- most likely refers to connections made in the forums, not imported from students' regular schools.

- "I'm sometimes put off by some topics because they often just turn into an argument between two regular forum contributors arguing against each other directly with long winded posts." (Randee)
- "I've never really got into the whole NAGTY thing--the vocal people on there have all their little internet friends, and I'm pretty sure that no-one knows who I am." (Britney)
- "I'm not in any of the friendship groups on the forums, and so feel like I'm interrupting a discussion between friends." (Jason)
- "Sometimes threads become hi-jacked--i.e., they are no longer discussing the relevant topic but something completely off topic. This at times can be fairly off-putting. Especially if you are new to a forum--you will want to feel that your posts are being read rather than buffeted by an off topic comment." (Kay)
- "I don't feel as intelligent as the others and I don't want to say anything that may seem silly." (Samuel)
- "Often a group of people are posting on a topic who all know each other, and the overall effect can be quite 'cliquey', excluding those not in the group." (Steven)
- "There is a very close-nit [sic] community between daily users and they are not very accepting/embracing to new or less frequent users which is extremely off-putting." (Georgia)

The one open comment about age also had a positive side:

- "I feel I've grown out of the forums. I'm getting too old and although I still speak to forummers, I don't tend to use the forums much any more. I use them if I need to but not because I want to. Having said that, six months ago I'd have said the complete opposite and it's unquestionable that the forums have helped me immensely." (Kirk)

Of eight substantive responses giving reasons for viewing the posts (Table 5), the first by far (75%) was joy in reading others' well thought-out messages. Then five about enjoying challenging learning and sharing, and just one about shyness (31%). Automated tracking counted views; participants' responses suggested that students who logged in also read posted material.

Table 5: Reasons for reading selected by participants who did not post.

% Selected	Reason Selected from among Questionnaire Choices.
75%	I love reading well thought out messages.
57%	I feel that I learn a lot from just reading the posts.
51%	As I read messages, often my own views on a certain topic change.
46%	Reading other posts has helped me to improve my own style of thinking things out.
35%	Even though some of the discussions are hard to follow I love to read them.
32%	Whenever I read something I discuss the issues further with others like my family, school friends, and teachers.
31%	I am quite shy to post.
27%	I am very motivated by what I read.
8%	Other.
4%	I have not read any messages.

Log-ins revealed repeated visiting. Engagement was vicarious but extensive. Open-ended comments echoed replies to the fixed-choice questions:

- "I enjoy seeing the different points of view and learning from other members." (Phil)
- "It's good to find out what ideas other people could have on different topics that I, myself didn't think were possible to have." (Hannah)

What we have decided to call active participation, whether posting or just reading, encompassed nearly three-quarters (73%) of students enrolled in the four sampled forums, and was most typically acknowledged as positive, both socially and cognitively. When asked broadly about how their forum experience met their personal needs, participants selected the following options (Table 6).

Table 6: Personal needs met by forum experiences.

% Selected	**Benefit Selected from among Questionnaire Choices**
82%	Providing me with the opportunity to be in the company of other like minded individuals.
78%	Providing me with the opportunity to debate with others.
60%	Providing me with the opportunity to further my special interests.
53%	Providing me with a forum where I can freely share my ambitions.
51%	Providing me with an opportunity to learn from others who are smarter than I am.
40%	Providing me with an opportunity to learn to reason.
24%	Providing me with an opportunity to work more on my own.
8%	Other.
4%	None of the above.

The five most frequent points were about social presence. First was being with others who shared interests--a fundamental quality of inquiry and adult social interaction. Close second was welcoming friendly disagreement. Just sixth was a cognitive-presence item, learning to reason. Only a quarter (24%) saw the forums as an opportunity to work alone: The fact that these were functioning communities was salient in these learners' experiences.

Open-ended comments about the asynchronous forums paralleled these observations, using

participants' own words, and reiterated earlier positive points about pursuing interests and building confidence:

- "Providing me with an opportunity to freely discuss my interests, misunderstandings and ideas in an environment where I know that nobody else will 'bully' or 'humiliate' someone for an interest in knowledge." (Joe)
- "Providing an opportunity to laugh, be cheered up and share troubles." (Dave)
- "Giving me a chance to express my view without people thinking that I'm 'weird'." (Sandy)
- "Providing me with the confidence in myself and my abilities to be more open and forthcoming in schoolwork and discussion, and to get along with others better and be less self-conscious." (Nancy)
- "Feel more confident that others want to listen to my views and become more confident in my own abilities." (George)
- "Providing me with a chance to exchange views on topics I can't talk to others about because they won't understand it." (Mel)
- "Providing me with the opportunity to speak freely without feeling like I'm showing off." (Harry)

Community was evident in the comments above and explicit in final overall observations by participants about a supportive environment and forming new friendships. We give participants the final word regarding results:

- "These forums really helped me through some 'tough' times, and I really felt that it was a supportive, encouraging, and close community--the best thing I've done in my life was filling in the application forms for NAGTY." (Sara)
- "I think they are a very good opportunity to learn and expand general knowledge within a community." (Leo)
- "Very respectful atmosphere despite greatly different viewpoints, e.g., I appreciate your point of view but--." (Linda)
- "I find it very helpful when nontutors choose to help answer my questions, as I know the answer has come from someone who I can relate to." (Simon)
- "I've made some lasting friendships through the forums." (Elka)
- "The forums are amazing, if a little crazy, and I've made great friends there." (Sean)

Utility of the COI Model

Across all 3113 coded messages, 65 of 69 available COI codes (94%) were used at least once, several of them (see Table 1) hundreds of times. Further to the *a priori* reasons for selecting the COI model and, as an ancillary outcome of this study, the coding system (Garrison et al., 2000) was easily used in this asynchronous setting serving secondary students (to our best knowledge, the first such application). The codes and model were appropriate to the task.

Summary of Main Results

We coded the first data set, 3113 archived messages posted by secondary students from across England, on four asynchronous discussion forums conducted outside their schools, according to the procedures specified by Garrison et al. (2000) in support of their Community-of-Inquiry (COI) model. All but four of the 69 codes were applied, and the most frequently assigned codes revealed that participants incorporated others' contributions in meaning making, expressed personal opinions and emotions, shared interests and experiences, and responded to leading questions posed by the facilitators.

Examples of the posted messages within each of the three COI presences illustrated the richness and depth of engagement. From the posted messages, a community of inquiry was also evident, that is, the kinds of collaborative interpersonal activities among participants and between participants and the facilitators that support inquiry-based learning and teaching.

Soon after these four forums were conducted, it was possible to survey 307 participants who

enrolled about their reasons for posting, not posting, or only reading or viewing, and about the benefits they felt from their involvement. Responses came from both those who posted messages and those who read posts but did not post their own messages. Students posted because they enjoyed challenging responses and they found the process of posting helped them clarify their thoughts (i.e., create new meaning for themselves). Most students who read posts but themselves did not post reported that they did not feel the need to post. They learned from viewing and reflected on what they read. Their comments added that they enjoyed reading what others wrote and sometimes followed up by discussing the content with others offline. About half as many felt intimidated writing, either because of the quality of the posts, shyness, or feeling that some rather exclusive groups formed online. Participants valued being with other like-minded and sometimes smarter people (the interest-driven nature of inquiry) and enjoyed the debates and free exchange of views that ensued. We were unable to connect with the 27% of students who enrolled but never logged in.

Finally, and secondarily, the COI model and its coding tools proved to be a sensitive and useful lens with which to explore the presence of a community of inquiry among secondary students in asynchronous online discussion forums. It had not previously been used in such a setting nor with secondary students.

Discussion

Triangulated data from coded transcripts, the transcripts themselves, and a post-experience survey indicated that a community of inquiry as defined by Garrison and colleagues (Cleveland-Innes et al., 2018; Garrison, 2007, 2015, 2017; Garrison et al., 2000) can exist in an asynchronous online discussion forum, and specifically among secondary students. Sanders and Lokey-Vega (2020) correctly anticipated that the COI model would equally apply at the secondary-school level, which this study confirmed. Previously, COI was addressed in higher and adult education, and live or synchronous learning environments. This study also affirmed the more general applicability of social-constructivist educational theory (Dewey, 1938; Schell & Butler, 2018; Vygotsky, 1978) within online instruction. Building on learner's interests is a key component of social-constructivist, inquiry-based curriculum (Shore et al., 2020), evident in students' topic choices and sustained participation over a full year including breaks. COI garnered attention in online learning because it also focuses on learning experiences and processes rather than just outcomes or the technology itself. Secondary-school-age students can build a learning community within asynchronous online collaboration. Having created a COI in an extracurricular environment, they should also be able to do so within the school curriculum.

Anecdotal information received after the study was completed (hence not reported as results) provided support for this assertion that the online experience can inspire and empower learners to seek out and create new connections they own themselves and with others with whom they choose to relate. Our study did not directly address curricular learning outcomes, but the transcripts showed that participants dealt extensively and in depth with the content of the forums. Some participants in the forums created their own online communities, without teacher presence and not necessarily on academic topics, with their new acquaintances after the forum experiences were over. We do not know exactly when these were initiated.

Asynchronous settings can also mitigate some internet-access problems, for example, a single device in one household or dependence on public (e.g., library) facilities, limited bandwidth, and scheduling. Our study was extracurricular, so there is no suggestion of replacing other instructional input. However, at the bottom line, an asynchronous online forum can support qualities of a community of inquiry. It might not always bring it about, but if the participants are able to function in that mode, they can bring that experience to such a setting; 34% of registrants posted messages versus Nielsen's (2006) report of 10% (5% on blogs), and posting was more evenly distributed. Counting both posters and viewers, 73% of the enrolled students participated actively in the asynchronous forums.

Some potential risks are not necessarily averted by an asynchronous environment. The main example experienced by the students whose archived material we examined was the existence of online cliques or friendship groups from which they occasionally felt excluded. These certainly exist in live classrooms, but our students were geographically dispersed and the forums were not connected to their schools. As a result, these cliques were unlikely to have been imported from their schools. This reminded us that the sponsoring organisation of the forums also operated a summer camp where some students might have previously met, but we did not encounter even one line of discourse that indicated recognition or a familiar contact--there was no evidence they knew each other. Student comments that we cited referred to meeting new friends. The key implication might be that asynchronous online discussion forums are not immune to common adolescent behaviour, wherever the source, and that facilitators (part of the Teaching Presence) need to be prepared to help participants navigate and negotiate these situations.

The study also uncovered original insights not predicted by previous research specifically on COI or online learning. First, viewing or reading without posting is also a form of active engagement; students who only viewed others' posts did so enthusiastically and extensively over a whole year and reported valuable benefits. They were not "lurking" (Beaudoin, 2002). It is important not to limit recognition of participation to students who post messages. For those who do not, it is valuable to track what posts they are viewing and to include them in follow-up assessments of the activity. They are perhaps the online equivalent of live-classroom learners who listen intently and reflect, but do not orally engage actively with others. Vygotsky (1978), who strongly asserted the importance of dialogue in meaning-making, also allowed for self-dialogue.

Viewers in this study reported similar experiences. Participants welcomed both finding like-minded peers and having their positions challenged, perhaps reflecting the convenience sample: High-ability learners welcome friends standing by their views in disputes (Chichekian & Shore, 2017) and accept friendly competition focused on the task more than the person (Schapiro et al., 2008). Similar dynamics occur in live workgroups (Barfurth & Shore, 2008); students need teaching presence regarding turn-taking, active listening, and collaboration (Anderson et al., 2001; Caskurlu et al., 2020).

Conclusions

Can a community of inquiry--as reflected in evidence for social-, cognitive-, and teaching-presence (Garrison, 2007, 2015, 2017)--exist in an asynchronous online learning environment? Unequivocally, yes. Secondary-student participants enthusiastically listened to and elaborated others' posts, expressed their opinions, disclosed information about experiences and interests, and followed-up on topics. Those who only read posts reported corresponding vicarious experiences. Activity was well sustained over a full year including summer and winter breaks. Interaction especially included social and emotional actions such as taking up each others' comments, agreeing and disagreeing, and receiving affirmation. In cognitive presence, the most common posts reflected students' own opinions. Participants frequently reported having their thinking skills or ideas influenced. Important teaching presence, especially asking stimulating questions and providing encouragement, came both from facilitators and students. Both modeled appropriate vocabulary and techniques for analysing and evaluating discussions when presenting counterarguments.

With only minor variations in the proportions of participants across the four forums, overall, about one-third (34%) read and posted messages. More (39%) read or viewed messages but did not post, mostly for positive reasons. Although some (38%) were shy or felt intimidated by the setting or more assertive participants, most viewers reported that they enjoyed reading what others wrote, these messages met their needs, and they were not impelled to add to what was there. We concluded they were silent-active participants. They logged in frequently, returned to favourite threads, and regarded their experiences positively. Active asynchronous-forum participation is not limited to participants who post messages.

Participation evidenced qualities identified in inquiry-based, social-constructivist learning (Aulls & Shore, 2008): interest-based participation, curriculum co-construction, and diversification of teaching and learning roles. Learners received communal support from other members and facilitators as mentors and role models for interpersonal and thinking skills. Dialogue and collaborative meaning-making were highly visible (Vygotsky, 1978).

Benefits were acknowledged by vocal and silent participants, and avoided some of the challenges in scheduling and access involved in synchronous interaction, or the development costs of simulations. Asynchronous learning settings remain relevant, even in the world of Zoom, Microsoft Teams, Google Meet, Glip, Webex, Skype, or FaceTime, and can be used effectively with secondary students. Asynchronous experiences (e.g., email, discussion forums, chat rooms, Google Document collaboration), allow greater numbers of learners to engage at times when they have access to devices and internet connections, and can work at their own pace. The content of these secondary-age students' asynchronous online engagement suggests that this is, however, best seen as a complement to more formal and real-time instruction, not a total replacement.

Finally, as a methodological side-point, the COI model and coding tools developed by Garrison's team (Anderson et al., 2001; Rourke et al., 2001a,b) to assess COI presence in computer-based settings are usable in asynchronous settings and with secondary learners.

Limitations

The discussion forums were voluntary and extracurricular. The sample of gifted students, while perhaps comparable to tertiary-student samples in prior research, was not broadly representative. Although we affirmed COI presence in this asynchronous environment, we did not compare synchronous environments.

Because the data had been archived in 2006, the software and platforms used were not the same as likely used now. Given the opportunity to explore these data when COVID-19 sent millions of learners to online platforms, we do not regard this as a major limitation, but we acknowledge it. Whatever the platform and state of technology, a community of inquiry can evolve in an asynchronous online context.

Future research

Generalisability to in-school, prescribed curricula and learning outcomes, more representative secondary-student populations, and comparisons among different contemporary online environments deserve further study. Although the COI model was a useful lens through which to view asynchronous online participation, more finely-granulated codes were helpful. Also, posted messages alone provided only a partial portrait of engagement. Silent students' engagement in synchronous environments is worthy of similar attention. Questionnaires, interviews, focus groups, or rating scales (e.g., Glassman et al., 2021), help include learners who just read others' messages; there might be greater confidence if such data could be collected from most or all participants concurrently with the online experience. How facilitators or teachers build and effectively use teaching presence also deserves specific attention.

Implications for practice

Case studies promote enhanced understanding of a phenomenon, in this case the potential for learners to develop a community of inquiry within an asynchronous online forum. This small number of suggestions are therefore not generalizations from our results, nor exhaustive, but reflections of the insights we have reported.

- An asynchronous online forum can evolve into community of inquiry, therefore asynchronous forums can be a part of a social-constructivist approach to teaching and learning.
- As in regular classrooms, there can be bumps on the road, especially in social interactions, therefore supportive monitoring and occasional intervention by a qualified teacher or other adult is essential.
- The availability of a wide range of topics attracted the interest of the participants, and participation

was voluntary. If those conditions vary, so might the outcomes (as they do in regular classrooms).
- This experience was extra-curricular, therefore there was no grading or evaluation. It might not be as easy to have similar outcomes in different situations.
- The seminars did not force posting messages, and the degree of success or impact was not revealed solely in the number of posts. Not posting does not imply failure to engage. Therefore, it might be useful to collect some kinds of feedback from students who post and who do not. This can be through questionnaire, interview, focus group, or other means.
- One of the great advantages from which this study benefitted was the detailed record kept of all the interactions, postings, and sign-ins, from all registered participants. Participants revealed a lot about themselves. Secure access and respect for privacy are essential.

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Appendices

Appendix A

Community of Inquiry (COI) Social-Presence Initial Codes (Adapted from Rourke, Anderson, Garrison, & Archer, 2001a).

Descriptors	General Codes	Specific
Affective	Expression of emotions	Conventional expressions of emotion, or unconventional expressions of emotion, includes, repetitious punctuation, conspicuous capitalisation, emoticons, e.g., "I just can't stand it when …!!!!" or "ANYBODY OUT THERE!"
	Use of humor	Teasing, cajoling, irony, understatements, sarcasm, e.g., "The banana crop in Edmonton is looking good this year ;-)"
	Self-disclosure	Presents details of life outside of class, or expresses vulnerability, e.g., "Where I work, this is what we do…" or "I just don't understand this question."
Interactive	Continuing a thread	Using reply feature of software, starting a new thread. Also software dependent, e.g., "Subject: Re" or "Branch from...."
	Quoting from others' messages	Using software features to quote others entire message or cut and pasting selections of others' messages. Also software dependent, e.g., "Martha writes:" or text prefaced by less than symbol "<."
	Referring explicitly to others' messages	Direct references to contents of others' posts, e.g., "In your message, you talked about Moore's distinction between…."
	Asking questions	Students ask questions of other students or the moderator, e.g., "Anyone else had experience with WEBCT?"
	Complimenting, expressing appreciation	Complimenting others or contents of others' messages, e.g., "I really like your interpretation of the reading."
	Expressing agreement	Expressing agreement with others or content of others' messages, e.g., "I was thinking the same thing. You really hit the nail on the head."
Cohesive	Vocatives	Addressing or referring to participants by name, e.g., "I think John made a good point," or "John, what do you think?"
	Addresses or refers to the group using inclusive pronouns	Addresses the group as we, us, our, group, e.g., "Our textbook refers to..." or "I think we veered off track…."
	Phatics, salutations	Communication that serves a purely social function; greetings, closures, e.g., "Hi all," "That's it for now," or "We're having the most beautiful weather here."

Appendix B

Community of Inquiry (COI) Cognitive-Presence Initial Codes (Adapted from Rourke, Anderson, Garrison, & Archer, 2001a).

Descriptors	Indicators	Examples
Triggering Event Evocative	Recognising the problem	Presenting background information that culminates in a question.
	Sense of puzzlement	Asking questions. Messages that take discussion in new direction.
Exploration Tentative	Divergence--within the online community	Unsubstantiated contradiction of previous ideas.
	Divergence--within a single message	Many different ideas presented in one message.
	Information exchange	Personal narratives/descriptions/facts (not used as evidence to support a conclusion).
	Suggestions for consideration	Author explicitly characterises message as exploration, e.g., "Does that seem about right?" or "Am I way off the mark?"
	Brainstorming	Adds to established points but does not systematically defend/justify/develop addition.
	Leaps to conclusions	Offers unsupported opinions, e.g., "One reason I think it is seldom used is that it is too complicated to get cooperation."
Integration Provisional	Convergence--among group members	Reference to previous message followed by substantiated agreement, e.g., "I agree because…." Building on, adding to, others' ideas.
	Convergence--within a single message	Justified, developed, defensible, yet tentative hypotheses.
	Connecting ideas, synthesis	Integrating information from various sources--textbook, articles, personal experience.
	Creating solutions	Explicit characterisation of message as a solution by participant.
Resolution Committed	Vicarious application to real world	None coded.
	Testing solutions	
	Defending solutions	

Appendix C

Community of Inquiry (COI) Teaching-Presence Initial Codes (Adapted from Rourke, Anderson, Garrison, & Archer, 2001a).

Descriptor	Indicators	Examples
Direct Instruction Instructional management	Defining and initiating discussion topics	Present content/questions, e.g., "Bates says…what do you think…?" Focus the discussion on specific issues, summarise the discussion and confirm understanding through assessment and explanatory feedback, and diagnose misconceptions, e.g., "I was at a conference with Bates once and he said…. You can find the proceedings of the conference at http://www…." Inject knowledge from diverse sources, and respond to technical concerns, e.g., "If you want to include a hyperlink in your message you have to…."
Facilitating Discourse Building understanding	Sharing personal meaning	Identify areas of agreement/disagreement, e.g., "Joe, Mary has provided a compelling counter-example to your hypothesis. Would you care to respond?" Seek to reach consensus/understanding, e.g., "I think Joe and Mary are saying essentially the same thing." Set climate for learning, e.g., "Don't feel self-conscious about 'thinking out loud' on the forum. This is a place to try out ideas, after all." Draw in participants, prompting discussions, e.g., "Any thoughts on this issue?" or "Anyone care to comment?" Assess the efficacy of the process, e.g., "I think we're getting a little off track here."
Instructional Management--Design and Discourse Organisation Direct instruction	Focussing discussion	Setting curriculum, e.g., "This week we will be discussing…." Designing methods, e.g., "I am going to divide you up into groups, and you will debate…." Establishing time parameters, e.g., "Please post a message by…." Utilising medium effectively, e.g., "Try to address issues others have raised when you post." Establishing netiquette, e.g., "Keep your messages short."

Appendix D

Online questionnaire

1. Participation: Reading/Posting

1. Reading other posts

Choose all the options that may apply to you:

A. I love reading well thought out messages.
B. As I read messages, often my own views on a certain topic change.
C. I am very motivated by what I read.
D. I have not read any messages.
E. Whenever I read about something I discuss the issues further with others like my family, school friends and teachers.
F. Even though some discussions are hard to follow I love to read them.
G. Reading other people's posts has helped me to improve my own style of thinking things out.
H. I feel that I learn a lot from just reading the posts.
I. I am quite shy to post.
J. Other (please specify) [response box provided].

2. I do not post a message because

Choose all the options that best describe how you feel

A. I feel intimidated by the messages already posted.
B. I feel intimidated because of the large audience.
C. There are too many female contributors and I am male.
D. There are too many male contributors and I am female.
E. I am too young compared to others on the forum.
F. I am too old compared to others on the forum.
G. I feel that I don't need to post.
H. Other (please specify) [response box provided].

3. When I do post a message:

Please choose all the statements that may apply to you

A. I get discouraged when my message does not get any response.
B. I do not care if anyone replies as long as I get my opinion across.
C. As I write I find myself thinking more clearly than when I speak.
D. I often discuss issues with others (friends, teachers, in class, or family members) before I decide to post.
E. I find it easier to state my viewpoints in the online environment compared to face-to-face discussions.
F. I enjoy getting messages back that challenge my opinions.
G. The process of posting helps me learn how to think and write carefully.
H. Other (please specify) [response box provided].

2. Community/Membership

1. Sense of community

Please choose one option from each row which indicates the extent to which each of the following statements applies to you [for each statement, four response buttons to click: Not at All, Somewhat, Quite a bit, Very much]

A. I feel like I belong to a community.
B. There is a cooperative sense of learning within the forums.
C. I find the forum atmosphere to be friendly and approachable.
D. I can get help from the community members if I need it.
E. There is a lack of communication between the community members.

F. Whenever I find something new about the topic we are discussing I share it with other community members.
G. I like the opportunity to view and share opinions of other gifted and talented students.
H. I am proud to be a member of the gifted community.
I. When someone asks for help I ignore it even if I know the answer to their question.

2. My engagement with the forums

Please choose one option from each row which indicates the extent to which each of the following statements applies to you [for each statement, four response buttons to click: Not at All, Somewhat, Quite a bit, Very much]

A. Helps me with my schoolwork.
B. Has helped me become more confident at school.
C. Has helped me to accept myself as someone with more intense interests.
D. Has helped me to realise that I am not as clever as I thought I was.
E. Has offered me a challenge that I couldn't find at school.

3. Meeting Needs

The online community meets my needs as a gifted and talented learner by:
Please choose all the options which best show how you feel.
If there is something missing, please specify!

A. Providing me with the opportunity to be with other like minded individuals.
B. Providing me with the opportunity to further my special interests.
C. Providing me with the opportunity to debate with others.
D. Providing me with a forum where I can freely share my ambitions.
E. Providing me with an opportunity to learn to reason.
F. Providing me with n opportunity to work more on my own.
G. Providing me an opportunity to learn from others who are smarter than I am
H. None of the above.
I. Other (please specify) [response box provided].

4. Instructor Role

Please read each statement and then choose the options which best show how you feel.
If there is something missing please specify!

1. Tutor/instructor role

A. The questions asked by the tutors are too difficult.
B. The questions asked by the tutors are very helpful.
C. I feel that the tutor is like a role model because he/she is an expert in the subject of my interest.
D. When I feel confused about something I feel like I can ask my tutor(s) for help.
E. I am not comfortable asking any questions.
F. The tutor(s) encourage me to think.
G. When the tutor summarises all the previous messages I find it very helpful.
H. The tutors encourage us to take leading roles.
I. Other (please specify) [response box provided].

5. Logging in Patterns

1. Please choose the option that best describes your logging in pattern
Choose one option from each drop-down menu

I usually log in
1. Before school
2. During school
3. After school
4. Late at night

Number of times I log in
1. Once a day
2. 2-5 times a day
3. Once, maybe twice a week
4. Once in a while only
5. Never

When I log into the forums I usually end up reading
1. 1-5 messages
2. 6-10 messages
3. 11-15 messages
4. 16-20 messages
5. 26-30 messages
6. More than 30 messages

The time I spend on the forums is between
1. None
2. 0-15 min a day
3. 16-30 min a day
4. About an hour a day
5. 15 min to an hour a week
6. More than an hour a week

2. Do you belong to any non-NAGTY forums?
A. No
B. If yes (please specify) [response box provided]

3. Which of the following groups do you participate in?
A. Ethics and Philosophy
B. Reading Group
C. Science (Previously Astronomy & Space)
D. General Debates
E. Others (please specify) [response box provided]

6. Additional Comments
Please take a minute to add any other comments that you think are relevant to any aspect of the discussion forums [response box provided]

7. Thank You
Your participation in this survey is greatly appreciated. Thank you for your kind help.

Appendix E

Ethics and Philosophy Forum Monthly Topic, Frequencies of Posts and Views.

Month	Topics	Posts	Views
March	Why do we have to be told to protect our planet?*	15	1
April	Is science true because people believe in it, or do people believe in science because it is true?	95	1
May	Questionnaire feedback.	0	1
June	Should life be preserved?	55	0
July	When is violence justified? *July Essay Challenge: Man is a political animal. Discuss.*	33 1	46 9
August	Should the government be able to regulate the reproduction of the species? *Do societies need role model?*	58 17	0 42
September	*Should life be valued above all else?* Do we have a moral obligation to help people in need?	24 36	114 40
October	*Are teenagers out of control?* When are you in control of your life?	24 66	129 13
November	Is anyone else alive? *Do we need our faces?*	48 18	71 154
December	Is acting for the greater good a 'good' thing to do? *Do animals feel?* *World religion* *Media Microscope V: Whose responsibility?*	39 10 58 13	291 78 380 121
January	What is betrayal? *Media Microscope VI: Are the Jedi moral beings?*	34 13	235 130
February	*Should under 18's be recruited for the army?* Is punishment evil? *Media Microscope VII: Is prohibition morally wrong?* *Descartes* *Homework-views* *Essay Challenge-Is cloning wrong?*	27 30 12 27 13 6	160 262 107 235 119 152
Total		**772 (509)**	**2891**

***Note:** Thread topics shown in regular font (not italic) were coded for this study (509 of 772 posted messages).

Appendix F

Reading Group Forum Monthly Topic, Frequencies of Posts and Views

Month	Topic	Posts	Views
March	Private Peaceful	37	2
	The Great Gatsby	16	1
April	The Heart is a Lonely Hunter	13	1
	The Catcher in the Rye	76	2
May	Joy Luck Club	14	1
	Far from the Madding Crowd	83	0
June	The No. 1 Ladies Detective Agency	24	0
	The Hitch Hiker's Guide to the Galaxy	155	1
July	All Quiet on the Western front	41	0
	Slaughterhouse-Five	14	2
August	The Fellowship of the Ring	48	1
	My Family and Other Friends	10	0
September	Things Fall Apart	51	4
	Cry, The Beloved Country	10	0
October	Cat's Eye	16	0
	Dracula	32	10
November	Thursday's Child	32	53
	Boy	22	29
December	Harry Potter and the Chamber of Secrets	127	551
	The Subtle Knife	105	447
January	The Da Vinci Code	48	386
	A Short History of Nearly Everything	31	250
February	Lucas	25	224
	Martyn Pig	22	197
Total		**1052**	**2162**

Appendix G

Astronomy and Space Forum Monthly Topic, Frequencies of Posts and Views.

Month	Topic	Posts	Views
March	Welcome	113	2
	Suggest a topic	74	5
	Impacts from space	58	4
April	How the sky works	21	3
May*	Image processing	95	4
August*	Asteroids	15	3
September	Black hole hunt	29	1
October	Astronomy computer sims	23	3
November	Space tourist	2	1
December	Hollywood goes to the moon	39	4
January	What is a planet?	48	9
February	Our future in space	20	6
Total		**537**	**45**

***Note:** Inactive during June and July.

Appendix H

General Debates Forum Monthly Topic, Frequencies of Posts and Views.

Month	Topic	Posts	Views
March	Student perspective on English in the 21st century	34	2
April	Personalised learning –The student voice*	27	55
	Political correctness: Going too far?	136	4
	Should the UK adopt the new EU constitution?	88	0
	Family and friends: Who is more important?	41	1
	Invasion of privacy	22	0
May	*Life on another Planet?*	104	0
	Yob culture	85	4
June	Global warming	82	141
	The Amazon rainforest	46	20
	Avian flu: The next epidemic	23	11
	NHS: Should it be privatised?	80	2
	MRSA [methicillin-resistant **Staphylococcus aureus]**	31	0
	Ecology versus economy?	11	0
July	Armed police: An ethical dilemma?	39	0
August	Private schools	215	434
	The monarchy	149	167
	Marriage for same-sex couples	44	1
	The Iraq war	132	591
	What is evil?	105	346
September	*Better to have than to lose and never have*	37	95
	Religion versus science	150	325
	Firearms laws	30	0
	Where did the universe come from?	164	667
October	Vegetarianism	133	471
	Rap music and its influence on society	142	301
	Are top up fees a good idea?	17	33
	Charities--which ones to support?	57	274
November	Life sentence for prisoners	69	193
	Fathers for Justice	48	273
December			
January	*The media's influence on politics*	42	291
	Communism	127	905
	Death penalty?	158	817
	Corporal punishment in schools	28	337
	The veggie option	61	547
	Is hope a good thing?	42	399
	Math theory	101	704
	Should we arm the police?	43	246
	Does feminism have a role to play in the 21st century?	39	394
	Censorship or protection--do children have a right to choose what they read?	37	326
	Smoke and the city	56	378
	How important is a health diet--and who is healthy?	32	281
	Terrorism	72	414
	Do all religions lead to the same god?	33	287
February	Peace in the Middle East	33	259
Total		**3245 (1015)**	**10996**

***Note:** This forum was inactive in December. Thread topics shown in regular font (not italic) were coded for this study (1015 of 3245 posted messages).

Appendix I

Social-Presence Final Codes.

Code	Assigned Frequency
Asking questions from Community Members	5
Asking questions--General	44
Asking questions--Topical	25
Expressing appreciation	18
Expressing appreciation--Complimentary	24
Expressing appreciation--Agreement	33
Display of Emotions	77
Display of Humour	37
Self-disclosure (not in following categories)	2
Self-disclosure --Sharing information about events, materials, etc.	18
Self-disclosure --General revealing fact	139
Self-disclosure --Low confidence, confused	12
Self-disclosure --High confidence, self-assured	15
Interpersonal relations--Using first name	88
Interpersonal relations--Showing solidarity with group	78
Quoting from other's message/continuing a thread	232
Referring explicitly to others' messages	12
Referring explicitly to others' messages--Providing an answer	95
Referring explicitly to others' messages--Asking further clarification	16
Sensitivity (not in following categories)	2
Sensitivity--Helping others	10
Sensitivity--Strong beliefs	13
Recognition of the importance of new information/skills	1
Persistence	4
Accepts responsibility for one's behaviour	1
Recognises need for balance between freedom/responsible behaviour	13
Accepts professional ethical standards	5
Prioritises time effectively	0
Self-reliance in independent work	1
Cooperative when working with others	2
Values people for what they are	0

Appendix J

Cognitive-Presence Final Codes.

Code	Assigned Frequency
Triggering events--Recognition of problem	33
Triggering events--Sense of puzzlement	71
Information exchange--Sharing	6
Information exchange--Adds to knowledge base (shares, compares, facts)	39
Follows instructions successfully	24
Expresses opinion/views (not in following categories)	1
Expresses opinion/views--Own view (I think, I believe, in my opinion)	189
Expresses opinion/views--Agreement with other's message + own views	75
Expresses opinion/views--Disagreement with other's message + own views	81
Further detailed message following previous one	2
Answers someone's question	40
Suggestions for further consideration	33
Application [of knowledge]	7
Negotiation of meaning/co-construction of knowledge	11
Disagreement--no supportive argument	2
Disagreement--with supportive argument	19
Disagreement--with supportive argument + comments taking discussion forward	75
Agreement with other's message + raising more points	22
Analysis (not in following categories)	6
Analysis--Agreement + disagreement	2
Analysis--Logical ordering	0
Judging--compares, appraises, concludes, criticises	1
Questioning evidence provided for argument	2
Recognising subjectivity	7
Making choices based on Reasoned argument	0
Critical assessment of idea/material/book	0

Appendix K

Teaching-Presence Final Codes.

Code	Assigned Frequency
Direct instruction (not background information)	9
Direct instruction--Background information about topic and expectations	49
Facilitating discourse--Constructivist approach	6
Facilitating discourse--Sharing personal preferences/role model	2
Asking leading* questions	132
Correcting someone's response and getting discussion on course	2
Summarising arguments and asking more leading questions	19
Answering someone's question directly	68
Instructional design and organisation (not in following categories)	2
Instructional design and organisation--Reinforcement of rules	4
Instructional design and organisation--General programme questions	18

*The term "leading" was used in the sense of leading or initiating dialogue, not in the sense of trying to influence a reply in one direction or another.

Appendix L

Intercoder Agreement Calculation: Coding the "What is Betrayal?" Thread.

Code	Coder 1 Segments Assigned this Code (*n*)	Coder 2 Segments Assigned this Code (*n*)	Disagreements (*n*)
Showing solidarity with group.	1	1	0
Strong beliefs.	1	1	0
Sense of puzzlement.	1	1	0
Recognition of problem.	1	0	1
Disagreement with other's message + own views.	1	1	0
Suggestions for further consideration	1	1	0
Further detailed message following previous one.	1	1	0
Summarising and proposing solution.	1	1	0
Critical assessment of ideas/material/ books etc.	1	0	1
Encouragement.	1	1	0
Recognises need for balance between freedom/responsible behaviour.	2	2	0
Agreement + disagreement with supporting statements.	2	1	1
Connecting ideas from various sources.	2	3	1
Summarising arguments and asking more leading questions.	2	2	0
Answering someone's question directly.	2	2	0
Background information about topic and expectations.	2	5	3
Agreement with other's message + own views.	3	1	1
Providing an answer.	4	8	4
With supportive argument + comments taking discussion forward.	5	3	2
Own view: I think; I believe; in my opinion.	9	12	3
Asking leading questions.	7	8	1
Quoting from other's message/continuing a thread.	11	11	0
Totals	**59**	**66**	**19**
Agreement = (((59 + 66) - 19) / (59 + 66)) × 100 = (106 / 125) × 100 = 85%			