Chapter 6
Remote Community Engagement in Higher Education

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ABSTRACT

This chapter examines strategies implemented to increase a sense of community for faculty and students in an online graduate engineering program. Facilitating community sites of interaction and shared knowledge creation—elements of the community of practice (CoP) framework—comprised the most valued additions for members of the learning community. With these improved sites of interaction, faculty and students benefited from participation in the learning community with their online peers and contributed to a community of practice in their degree program. Early data and outcomes suggest that higher education administrators can implement specific strategies to increase learners' and teachers' sense of community, facilitating engagement with the school, academic programs, and peers despite being geographically dispersed.

INTRODUCTION

In this chapter, readers will learn about a strategic approach to increase a sense of community (SoC) in an online graduate engineering program at Johns Hopkins University with over 6,000 learners and 600 faculty. The approach detailed in this chapter was developed over two years in response to five years of annual survey data where students indicated that they did not feel a SoC. Improving a

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SoC for students is associated with other areas of focus for the school, including increased retention and degree completion (Ehrenberg & Zhang, 2005; Jacoby, 2006; Jaeger & Eagan, 2011), greater commitment to the organization (Milliman et al., 2003), decreased work stress (Royal & Rossi, 1996), and increased collaboration, knowledge sharing, and communication (Andersen et al., 2013; Rovai, 2002). Early data and outcomes from the approach described in this chapter suggest that higher education administrators can implement specific strategies to increase a SoC for learners and teachers, facilitating engagement with the school, academic programs, and peers despite being geographically dispersed.

Two primary sites of student and faculty interaction and community development were implemented and observed over a three-year period from March 2019 to April 2022. The strategies implemented in this online graduate engineering program are based on the theoretical components of creating a community of practice (CoP) in digital environments outlined by Wenger et al. (2002). Three primary elements encourage the growth of a community: (a) domain, (b) community, and (c) practice (Sherer et al., 2003, p. 185).

- Domain: The shared interest or passion of a community. Membership in the domain requires a level of competence and commitment that distinguishes members from non-members.
- Community: The pursuit of shared interest as members seek to gain competence and recognition, including information sharing, engaging in conferences and events, and collaboration on a shared issue. This pursuit of a common interest enables members to learn from one another and increases their participation as they seek visibility and belonging within the community.
- Practice: The sustained interaction of the practitioners as they develop a set of resources: documentation, stories, ways of interacting, and tools.

For this chapter, a learning community can be viewed as a community of practitioners consisting of students and faculty who develop a SoC through sharing resources, knowledge, and goals. A SoC is used to explore feelings of connectedness and learning expectations within the CoP framework (see Theoretical Framework section).

A combination of end-of-year surveys and online content analysis was used to measure a SoC. The data used in this chapter comes from faculty and adult learners in an online graduate engineering division at Johns Hopkins University, which has offered online master's degrees through its part-time engineering division for over 20 years. At the time of this study in Spring 2022, there were 22 master's programs (20 can be fully completed online), 14 post-master's certificates, 11 graduate certificates, and 593 unique online courses taught by approximately 600 adjunct faculty with a student headcount of over 6,000, making it the second-largest part-time online engineering division in the United States.

STATEMENT OF THE PROBLEM

The challenge that higher education institutions (HEIs) offering online education face is creating a sense of community (SoC) for its faculty and students due to the lack of physical connectedness. Studies have found several benefits to the organization (the domain) and the learning experience by developing a SoC, including increased retention and degree completion (Ehrenberg & Zhang, 2005; Jacoby, 2006; Jaeger & Eagan, 2011), greater commitment to the organization (Milliman et al., 2003) and decreased

work stress (Royal & Rossi, 1996), and increased collaboration, knowledge sharing, and communication (Andersen et al., 2013; Rovai, 2002). To fully understand this challenge, one must explore the evolution of the technologies and practices used in online education.

Advancements in educational technology in the 21st century created unique opportunities for HEIs to offer online courses and programs to students who no longer had to live in the same geographical area to learn in a physical classroom. While overall enrollment in higher education has declined over the past 20 years, online education has seen steady growth in the United States (Allen et al., 2016). Since 2000, online education course enrollments have increased annually (Seaman et al., 2018). For graduate students, the number has increased each year since 2012. However, while enrollments have grown in online programs due to flexibility and ease of access, student retention remains a concern, with attrition rates being 10-20% higher in online courses compared to onsite programs (Bart, 2012).

The convenience of online programs attracts students to apply and enroll. But once enrolled, they can become disconnected due to a lack of community interaction (Dziuban et al., 2013). To address attrition rates and improve learning outcomes, increasing students' SoC or feeling of connectedness in the program is a key component of engagement and an indicator for degree completion (Berry, 2017; deNoyelles et al., 2014). Universities have recently taken a more comprehensive approach to the student experience, moving beyond improving content delivery, technology, and student services to include opportunities for students in online courses to build a community (Allen & Seaman, 2014; Marinoni et al., 2020; Meyer, 2014).

Since faculty are the primary point of contact for most students as they navigate through their program, engaging and retaining faculty is an essential component of learning community development (Eagan & Jaeger, 2008). Across student populations and content delivery methods, regular interaction with faculty is vital to student engagement within the course and with the larger community (Andersen et al., 2013; Walker, 2016). This is particularly important for online programs, which are largely taught by part-time faculty. Studies have found that increases in part-time faculty have a negative impact on rates of student retention and degree completion (Ehrenberg & Zhang, 2005; Jacoby, 2006; Jaeger & Eagan, 2011). For faculty engaged in course delivery, SoC has been linked to an increased SoC at work (McGinty et al., 2008; Milliman et al., 2003) to greater commitment to the organization (Milliman et al., 2003) and decreased work stress (Royal & Rossi, 1996). Providing spaces for interactions between learners as well as faculty increases group collaboration, knowledge sharing, and communication (Andersen et al., 2013; Rovai, 2002). The opportunity for students to interact with faculty and peers by asking questions, sharing opinions, or disagreeing with varying points of view is vital to the learning experience (Garrison et al., 2001).

While there is a large body of research on SoC, there is no standard definition used across studies. Rovai (2002) specifies two core components of SoC—feelings of connectedness, and shared learning expectations—and reviews several common definitions of SoC. One such definition is from McMillan and Chavis (1996), who state that it is "a feeling that members have of belonging, a feeling that members matter to one another and to the group, that they have duties and obligations to each other and to the school, and that they possess shared expectations that members' educational needs will be met through their commitment to shared learning goals" (p. 9).

It is this summary of SoC that the authors feel is critical to developing a CoP for an online, graduate engineering program.

THEORETICAL FRAMEWORK

The following section will outline the main theoretical framework in this study—community of practice (CoP)—and several conceptual frameworks that support the development of a CoP, including social constructivism, Moore's three types of interaction, Bloom's Taxonomy of Educational Objectives, and adult learning theory, or andragogy. The CoP is examined in two main ways: (a) at the school/division level, and (b) at the course level.

Community of Practice

A CoP is a group of people with a shared interest, a craft, or a profession who develop a set of practices around their domain (Lave, 1991; Wenger, 1998). A CoP develops through the initiation and guidance of newcomers by existing members in a process that creates events, materials, and knowledge to further the practice (Lave, 1991). Online communities such as those involved in the development of learning experiences provide social organization and structure identity for those looking to enter or change status within the program (Wenger, 1998, p. 241). The social context that regulates community dynamics, as reflected in the practices of production of learning experiences, determines the symbolic and material resources, social and communication networks, and the existing power structures of the CoPs (Fairclough, 2001, p. 122).

The CoP and the objects or traces of the community members' experience are interpreted as products of a system of relationships between community members, activities, and the larger field. In the context of this chapter, the online learning experience operates as a central system for community development and participation, legitimating and conferring symbolic power. The learning community defines itself by its engagement with the system of online learning, which involves the realized form of the practices of the community through the two primary sites of interaction: the division and the course. Because participation in the learning community requires literacy ranging from the practices of the domain to the terminology of the craft, an elevated level of expertise and knowledge is required to fully join the CoP, and careful gatekeeping and interaction rituals are in place to ensure that the degree secures and maintains its ability to confer value and status (Collins, 2004, p. 164). As new students and faculty attempt to engage with the community, they are invited more broadly to the program through their participation in the system of online learning.

Practices in the production of learning experiences (e.g., collaborative creation of group presentations, office hour discussions, annotations, etc.) mirror the shifts in culture within the learning community. Structural changes within the institution result in increased engagement and participation in practices valued by the institution, and these shifting institutional demands force communities to realign existing knowledge to fit the new realities. Transformations in traces of the experiences of the community (knowledge products) reify the practices of the community (Lave, 1991). These practices (e.g., editing syllabi, attending office hours, and participating in discussions) and products (e.g., course materials, board meetings) of the learning community provide the body evidence for this chapter. Faculty and students are practitioners within the domain and are part of a CoP, where the practice is online learning. The practice of creating online learning experiences is the core platform and integral activity of the community. A CoP operates at three primary levels, each of which must be addressed to facilitate SoC within an online learning community: domain (e.g., graduate education), community (e.g., faculty, students, staff), and practice (e.g., producing learning experiences; Wenger & Snyder, 2000, p. 144).

Social Constructivism

John Dewey, a founder of constructivism, suggested that learners learn best by doing, and that learning should be grounded in individual and real-life situations. Dewey's work established that the learner must be interested in an issue, thus activating the learner's need and desire to resolve the issue (Duffy & Cunningham, 1996). In constructivist thought, the learner is an active participant in the environment and constructs meaning from their experiences in the world.

Lev Vygotsky posited that learners construct knowledge partly through a social process (Duffy & Cunningham, 1996). Social constructivism, also called socio-constructivism or historicism, is a branch of constructivism that focuses on the interactions of learners and instructors, the learning environment, and cultural contexts. This branch of constructivism places emphasis on social interaction as an integral component to learning. Vygotsky's concept of Zone of Proximal Development, or ZPD, is the foundation for an educational practice more popularly known as scaffolding. Scaffolding is a process of learning in which the individual increases levels of cognition through the help of a supporter, or someone with a higher level of knowledge. In the online environment, this person is often the instructor but also includes peer learners.

According to Berge (1995, 2008), the online instructor plays a "social role" by encouraging social interactions among learners to foster and build relationships. When applying social constructivist theory to the online learning environment, technology can provide a way to facilitate interaction so that learners interact and learn from each other and the instructor rather than in isolation. Interaction is a broad term that Moore's three types of interaction can help clarify.

Moore's Three Types of Interaction

Moore (1989) developed descriptions for three specific types of interaction that occur in a distance learning environment: (a) learner-content, (b) learner-instructor, and (c) learner-learner. Through the years, researchers have used his definitions to understand the overall concept of interaction and to "overcome the misunderstandings between educators who use different media" (Moore, 1989, p. 1).

First, in learner-content interaction, the content, or subject matter, is the foundation for learning. The instructor is usually considered the subject matter expert (SME) who delivers information about the content. In an online course, content is delivered through different mediums such as lectures, reading materials, videos, and interactions with the instructor and other learners, to name a few. Learning occurs when there are "changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind" (Moore, 1989, p. 1) after interacting with the content.

Second, learner-instructor interaction generally involves the communication and facilitation of content by the instructor to the learner. The instructor ultimately determines if the learner understands the subject matter and can apply new information appropriately. In an online classroom, this type of interaction is helpful for many reasons. The instructor typically develops a curriculum to retain and encourage learner interest and motivation. The instructor may create presentations based on the developed curriculum or include other learning materials within the course. Learners access these materials and practice or apply their knowledge of the material. The evaluation process often occurs when instructors provide support and feedback to learners about their practice and application of the material, most often in the form of grades, which helps students better gauge mastery of the learning outcomes. Additional opportunities for this type of interaction include email correspondence, synchronous meetings, and discussion boards.

Learner-instructor interaction is particularly valuable to learners because they can interact with SMEs and draw on an instructor's professional and educational experiences.

Lastly, learner-learner interaction is at the heart of the social constructivist point of view included in the theoretical framework of this research paper. Learners interact with one another in a group setting (e.g., in a discussion board or small group project) or in a one-on-one situation (e.g., email correspondence or synchronous meeting space). This interaction occurs between the learners through group activities, course activities, or other activities and may or may not include instructor presence. These interactions can be synchronous or asynchronous in nature. However, facilitating learner-learner interactions depend on a variety of factors. Moore (1989) suggests that group interaction is desirable depending on the learner's "age, experience, and level of learner autonomy" (p. 3). He further notes that learner-learner interaction that encourages motivation may not be as important for adult or advanced learners (typically self-motivated learners) as for younger or novice learners. However, an activity that "acknowledges and encourages the development of their expertise but also tests it, and teaches important principles regarding the nature of knowledge and the role of the scholar as a maker of knowledge" (Moore, 1989, p. 3) is more appropriate for adult or advanced learners who bring their worldview and professional experiences into the learning environment. This suggests that adult learners benefit from a learning situation that accounts for their diverse needs.

Bloom's Taxonomy

In 1956, educational psychologist Dr. Benjamin Bloom, with his colleagues, created a classification of learning objectives in what is now known as Bloom's Taxonomy of Learning. The taxonomy, a hierarchical representation of cognitive levels (remembering, understanding, applying, analyzing, and evaluating), provides a "clear, concise visual representation" (Krathwohl, 2002) of alignment between what the learner is expected to do (i.e., educational objectives) and how the learner demonstrates mastery of the stated learning objectives (i.e., assessment and mastery). In education, the taxonomy has proved a fundamental resource for writing measurable student learning objectives (Mager, 1997; Marzano, 2009) In addition, it has provided a model for identifying learning outcome indicators and measuring results against those indicators (McNeil, 2011).

It is important to acknowledge that the students referenced in this study are adult learners who enter the learning environment with significant professional, educational, and life experiences that ultimately influence their learning and learner-learner interactions. Using Bloom's Taxonomy of Learning can help establish clear objectives for what the learners will achieve during the interactions in the course. The development of these learning objectives needs to align with the audience. This can be achieved using the adult learning theory as a foundational building block for the objectives and experience in the course.

Adult Learning Theory

The term *pedagogy* refers to the "art and science of teaching children" (Knowles, 1984, p. 52) and is often used to describe adult learning. Malcolm Knowles proposed andragogy as a theoretical model to differentiate between the learning needs of children and adults. Andragogy consists of the following six principles of adult learning.

1. The need to know: This principle refers to the importance of establishing a reason for learning. Knowles (1984) suggested that the facilitators of learning should make a case for the value of what is being presented, as adult learners will appreciate content relevant to their lives and the application of the material grounded in real-world experiences.
2. Learner's self-concept: Adult learners are responsible for their actions and behaviors. They are self-directed and may feel resentful in situations in which they are treated as dependents (Cranton, 1994; Knowles, 1984). For this reason, what works for younger learners is not always appropriate for adult learners.
3. Role of learner's experience: Adult learners enter a learning situation with the benefit of having a wide range of life experiences.
4. Readiness to learn: This principle assumes that learners must be in the right place at the right time for learning. Learners are ready to learn when the need to know something arises. This is why real-life applications are preferred for adult learners.
5. Orientation to learning: Adult learners are motivated when learning is centered around topics that will help them in their life situations because "adults are task-centered learners" (Knowles, 1984, p. 61).
6. Motivation: According to Knowles (1984), intrinsic motivation is more influential for adult learners than extrinsic motivation. Adult learners may be more motivated to succeed in a course to boost self-esteem or increase their quality of life and may not benefit from the kinds of external encouragement that a less mature audience might.

The program discussed in this study was designed for adult professionals already working in engineering who bring unique knowledge to the learning environment and learner-learner interactions. Understanding adult learning theory or andragogy is an important aspect of creating opportunities to develop a SoC for faculty and students within the two sites of interaction (the school and course (Yarbrough, 2018). The next section explores what the literature revealed about the impact of a SoC on the learning experience.

LITERATURE REVIEW

The following literature review provides context for developing a SoC within the two primary sites of interaction (school and course) discussed in this chapter. Increasing SoC among students engaged in online education requires addressing both the larger domain of the community (i.e., the school) and the localized site of interaction—the online course.

Online Course Interaction

Mclsaac et al. (1999) argue "that interaction may well be the single-most-important activity in a well-designed distance education experience" (p. 2). Interaction within a course encourages learners to analyze alternative ways of thinking and acting. Through this participation, learners explore their own experiences within the context of the activity. The interactions with the instructor and fellow peers provide the opportunity for the social construction of knowledge within the learning community, which is vital in online programs where regular and substantive interactions lack physical interactions experienced in a face-to-face environment (Delahunty et al., 2014; Shea et al., 2006).

The lack of physical presence means that technology plays a crucial role in enabling interactions in an online course. Learning management systems (LMSs; e.g.., Blackboard, Moodle, and Canvas) offer tools such as blogs, wikis, course messages, discussion boards, and integrations with third-party collaborative chat platforms (e.g., Microsoft Teams and Slack), enabling students to flexibly engage their peers and instructors (i.e., asynchronously or synchronously).

In addition to technology that fosters interaction, organizations such as Quality Matters (QM) provide frameworks and best practices for how interactions in online courses should be designed. The QM Rubric Standards state, "activities for learner-learner interaction might include assigned collaborative activities such as group discussions" (QM, 2013). These "best practices" have been adopted and, in some cases, mandated as part of an online course design. For example, Oregon State University (2022, p. 4) requires that all courses include three forms of interaction:

- Student/content (discussion boards, readings, videos, and research projects)
- Student/instructor (discussion boards, response to assignments, and general discussion forum facilitated by the instructor)
- Student/student (discussion boards, team projects, peer-reviewed assignments, and blogs)

The Online Learning Consortium (OLC, 2022) identifies interaction as a "best practice" in their Five Pillars of Quality Online Education. In addition, the OLC Quality Scorecard includes the following in its teaching and learning criteria: Student-to-student and faculty-to-student interaction are essential characteristics and are encouraged and facilitated (OLC, 2014). The International Board of Standards for Training, Performance and Instruction provides online learning and instructor competencies that identify interaction as a critical component (Forshay et al., 1986).

As demonstrated in the literature, the inclusion of interactions is a critical element of an online learning experience. According to Murphy and Cifuentes (2001), the discussion board as an asynchronous interaction tool is the most used form of computer-mediated communication in education. This is due to its wide-ranging benefits, such as deriving feedback from a larger student population and more diverse participation, providing opportunities for deeper and more reflective student thought, and accommodating different student populations within a course or program (Jinhong & Gilson, 2014). Records on discussions and interactions are accessible within an LMS and thus easy to evaluate to provide an objective assessment method (Rourke et al., 1999).

Online Discussions

Online discussion boards have provided a platform for students to learn from one another, moving away from a teacher-centered approach toward one that is more student-centered (Kupczynski et al., 2012). This student-centered approach, as suggested by Davies and Graff (2005), improves learning and provides support, especially to those students who may need additional help from the instructor and classmates. Research also suggests that online discussions foster greater participation in certain learning situations. For example, nonnative English speakers were shown to participate in discussions more frequently because prolonged writing times enable them to think, write, edit, and post their responses (McIntosh et al., 2003).

Opportunities to interact in an online discussion board enable students to have a voice and to connect with all members of the course, empowering less responsive, or otherwise quiet students to overcome their reluctance to participate and to feel secure and part of a social community (Betty Cox & Becky

Cox, 2008; Swan & Shih, 2005). Online asynchronous discussions are less likely to be dominated by a single student which is a common occurrence in a face-to-face classroom discussion (Redmon & Burger, 2004). Kehrwald (2008) suggests that the social nature of discussions promotes supportive behavior and connectedness among students. Because of the increase in social presence, students are more likely to contribute.

Despite the perceived benefits on the use of discussion boards, the data on its impact on learning is varied. Several studies discovered that students who participated more frequently in an online discussion received more points, and ultimately, a higher grade in the course than those who spent little time interacting with their peers and the instructor(s) in the forum (Cheng et al., 2011; Kay, 2006; Masters & Oberprieler, 2004). On the contrary, in an undergraduate study conducted by Davies and Graff (2005), 122 first-year students were evaluated to see if their participation on the online discussion board had any correlation on their summative performance. Although students who performed poorly in the course were found to have interacted less frequently with the discussion board, greater interaction did not lead to significantly higher performance and better grades.

Swan (2002) suggests that the inclusion of a discussion forum in an online course does not automatically result in learning. Therefore, which factors impact the learning experience and learning itself, as measured by higher performance? Research suggests two critical components: instructor presence and quality of interaction.

Instructor Presence

Even if student-centered approaches appear to affect student learning and social connectedness, the literature revealed that instructor presence (or other staff such as graduate assistants) in the discussion board also makes a difference in student learning. For example, the number of postings made by a student can have little impact on grades, but students who direct postings to an instructor or teaching aid commonly achieve a higher grade than those who post more often to other students (Finegold & Cooke, 2006). This also benefits the instructor, as student interaction with an instructor in a discussion board has resulted in positive instructor evaluations (Du et al., 2011).

Instructor-led discussion prompts can positively impact deeper learning (Du et al., 2011). The way the instructor develops the discussion prompt is of critical importance (Magnuson, 2005; Williams et al., 2015). Furthermore, Williams et al. (2015) state that the "depth of thinking is more likely to occur when discussion prompts require students to put together an original project that challenges claims, synthesizes information from the group, and cocreates new understandings" (p. 61). Extended posts (i.e., posts that explore topics and solutions in depth) can lead to higher levels of divergent and convergent thinking versus surface-level posts (i.e., exchange of pleasantries); instructors can influence this by explicitly explaining what they expect from student responses (Williams et al., 2015). Because asynchronous discussions can be extended beyond a set time frame, deep and critical thinking can be achieved as long as the quality of the interaction is high.

Quality of Interaction

The quality of interaction, specifically the evidence of critical thinking, is crucial in online interactions (DeLoach & Greenlaw, 2007; Magnuson, 2005; Weltzer-Ward et al., 2009). Critical thinking can be defined as identifying a problem, exploring the problem, suggesting a solution, judging the solution, and implementing the solution (Dewey, 1998, as cited in Weltzer-Ward et al., 2009, p. 169). Critical

thinking encourages experiential learning by bridging the gap between what is taught in academia and what is required to function effectively in the workplace and community (Lee, 2007). Achieving meaningful interactions that promote critical thinking requires more than having a discussion forum—it must include opportunities to engage in rich discussions, work collaboratively on group projects, and connect with the broader community. In the context of this study, the broader community is the engineering community.

Discussion Strategy

Weltzer-Ward et al. (2009) found that students tend to use opinions rather than reliable sources such as references, data, or theories as evidence to support their posts. Also common are low- and high-quantity responses containing a basic opinion and response to another student's post to meet a participation requirement (Kim et al., 2007). In this approach, students rarely respond to one another's opinions and often repeat others' points. This, coupled with the sometimes-chaotic structure of discussion boards (e.g., lack of turn-taking), often leads to interactions that lack coherence and depth (Brooks & Jeong, 2006; Herring, 1999). Other studies adduce that discussions in which factual information—rather than rich, meaningful topics—occurs frequently and is a prominent factor that influences the quality of the interaction (Darabi & Jin, 2013; DeLoach & Greenlaw, 2007; Ertmer et al., 2007).

Interactions involving conflicts of perspectives promote more critical thinking (Jeong, 2004), and ideally, discussion topics allow for a variety of opinions. Questions posed within these topics should be ambiguous and provide opportunities for students to scrutinize multiple viewpoints. In this way, students are required to respond with arguments that are multifaceted and have multiple solutions, which is at the heart of increasing critical thinking skills. Muilenburg and Berge (2002) posit four types of thinking that promote discussion: critical thinking, higher order thinking, distributive thinking, and constructive thinking. These types of thinking are both hierarchical and interrelated and "[t]he level of student thinking is directly proportional to the level of questions asked" (Muilenburg & Berge, 2002, p. 12).

Magnuson (2005) developed a discussion strategy focusing on including problem-based learning to promote experiential learning for students, as outlined below:

1. Determine the topic for the discussion board activity based on the content.
2. Determine the goals and objectives to be accomplished—the goals and objectives are tied to the content.
3. Decide what role the instructor will have and what role the learners will have.
4. Determine the methodology or how the learners can be engaged in the discussion board activity.
5. Sculpt the question to encourage higher-order critical thinking. Provide an experiential learning opportunity within the context of the activity. This question can be problem-based.
6. Consider how the learners might approach the problem/question posed on the discussion board.
7. Manage the discussion board.
8. Assess the learners' posts.
9. Reflect on the process.
10. Produce and provide any scaffolds that are required.

Research suggests that discussions enabling students to think critically result in a positive learning experience and impact learning depending on how the discussions are created and facilitated.

Group Collaborative Work

Courses that incorporate group collaborative work provide learners an opportunity to interact and contribute to their teams in a variety of ways to help craft solutions to challenges (Mentzer, 2014). In online learning, collaborative learning is connected to cognitively based instruction models, which stress student's active engagement and communication (De Miranda, 2004; Kelley, 2012; Kelley et al., 2020; Spector & Anderson, 2000). Accordingly, the need to incorporate collaboration work, particularly in engineering education, has risen to be one of the most important skills today—not only because of the need to engineer solutions, but also because of affective factors gained during collaborative work (Advance CTE, Association of State Supervisors of Math, Council of State Science Supervisors, & International Technology and Engineering Educators Association 2018; International Technology and Engineering Educators Association [ITEEA] 2020; Jones & Issroff, 2005). Some researchers have found that motivation as an affective element in student learning significantly contributes to collaborative learning (Jones & Issroff, 2005). Others have found that social interactions (Järvelä et al., 2008) and a strong SoC can motivate students within a group project (Reeves & Gomm, 2015).

Community-Engaged Work

Community-engaged learning is another pedagogical strategy that impacts the quality of interaction since it can enhance skills, deepen content knowledge, and increase the SoC (Hatcher & Bringle, 2010; Paquin, 2006). Community-engaged learning seeks to engage and accredit students within the curriculum for working in partnership with different organizations, most commonly to act on local societal challenges (Campus Engage, 2022). According to Goggins and Hajdukiewicz (2020), their community-engaged project enabled students to:

(i) develop the ability to identify, formulate and solve engineering problems in their field of study in a real world context; (ii) select and apply relevant methods from established engineering practice by critically using appropriate sources of information to pursue detailed investigations and research of technical issues in their field of study, (iii) recognise the importance of non-technical – societal, health and safety, environmental, and economic – constraints, and (iv) develop the ability to communicate effectively information, ideas, problems and solutions with engineering community and society at large. (p. 395)

Additional researchers have demonstrated that the ability to effectively interact and collaborate is critical in engineering education (Goggins & Hajdukiewicz, 2020; Han et al., 2022; Jacobs et al., 2021). However, being able to interact and collaborate within a team should be an educational outcome for HEIs. Based on the review of literature on the quality of interactions in online courses, the authors argue that incorporating more than discussion forums will lead to an increased SoC.

School-Wide Interaction

Research on the development of community in higher education highlights the importance of establishing spaces and activities that facilitate shared interactions between members (Wenger, 2011). The shared spaces and activities are formed around a central domain, which for this chapter is an online graduate engineering program. School-wide sites of interaction establish the space for collaboration and spaces

to consecrate the output of the collaboration. Because participation in an online learning community requires developing expertise and knowledge, the spaces for school-wide interaction (e.g., community group meetups, web conferencing and chat platforms, conferences) are the primary infrastructure for community gatekeeping and interaction rituals, which confer status within the community (Collins, 2004, p. 176). Amin and Roberts (2008) note that within the community of practice (CoP) framework, there are "four types of collaborative work: craft or task-based work, professional practice, epistemic or high-creativity collaboration, and virtual collaboration" (p. 356). While the course is a site where these four types of collaborative work are formally expressed, informal communication and community building happens outside of the course at the school level. In particular, virtual collaboration, which is often initiated at the course level (e.g., group assignments, study groups), occurs on school-wide sites of interaction. Research on CoP and sense of community (SoC) has highlighted the role of the institution and decision makers in facilitating interaction at the larger domain level of the community.

The four main sites of student and faculty interaction were implemented at the school-wide level, and were developed to increase the opportunity for informal interaction and networking among members (community), and enhance the visibility of the larger community (domain), which provides an environment for the day-to-day practices of the community within courses. The four sites of interaction for students, which will be discussed in depth later in the chapter, include New Student Orientation, Student Community, Student Advisory Board, and Community Day. The purpose of each was to initiate members to the social organization of the online engineering program, and provide spaces for connection outside of (and around) their course work.

Similarly, the four sites of interaction for faculty include faculty course development cohorts, faculty community, Faculty Forward trainings, and two faculty meetings. These four sites of interaction mirror the student sites of interaction in that they include an orientation, community communication space, advisory group, and event. Throughout their career, and especially with part-time and online programs, faculty seek out professional development with peers (Sherer, Shea, & Kristensen, 2003, p. 184). Establishing sites to facilitate interaction between faculty can help better develop faculty and connect them to the practices of the community. Cox (2001) identified two of the most common categories of faculty development: cohort focused, and issue focused--where the cohort-focused groups address "teaching, development, and learning needs" and issue-focused groups address a school-wide teaching and learning issue (p. 73). With online education, faculty need not only development on effective instruction but also on how to integrate and utilize educational technology (Reilly et al, 2012, p. 100). Adding cohort-focused and issue-focused faculty development opportunities with sites for informal conversation and collaboration helps develop a set of shared practices for the faculty community.

METHODOLOGY

The central concept of this study is that establishing specific sites of interaction, and facilitating access to those sites, can increase sense of community (SoC) among students in an online graduate program. To understand the impact of the sites of interaction and facilitation strategies on students and faculty, it is necessary to examine the community engagement at the established sites and the products of their engagement (e.g., documents, discussion posts). To assess SoC at the two primary sites of interaction—the school and course—data from past student and faculty surveys (sampled between 2016 and 2021) and online content from instructional platforms will be the source for analysis. Engagement will

be discussed using a microanalysis of online interactions (e.g., discussion content) and a macroanalysis of engagement trends (e.g., post activity, channel member totals) on the primary communication tool for the community (i.e., Microsoft Teams). The study includes two groups of practitioners: students and faculty. These groups were selected because they are the key actors within the domain of an online learning community.

To describe the change in SoC, the study will utilize a multiple method approach (Creswell, 1998). Content used for analysis in this study was selected based on the sites of interaction created by the authors of this chapter. These sites of interaction were strategically implemented using the community of practice (CoP) framework. A microanalysis of online data was conducted in order to examine the types of activity and practices of the community at the sites of interaction. Microanalysis (also sometimes referred to as close reading in other fields) of online content is a type of conversation analysis that examines community member interaction on a digital platform with the understanding that the interactions are embedded within the context of the communication tool (Giles et al, 2015). Microanalysis on the sites of interaction in this chapter, provides a method to understand the ways community members develop a shared SoC.

Research Design

The research design used in this chapter includes secondary data collected from five sources: annual graduating student survey, annual faculty meeting survey, faculty training and development sessions, annual student conference, and faculty and student activity on Microsoft Teams, which is the primary school-wide communication platform. The annual graduating student survey asks students questions about their experience throughout the process of getting a degree. The survey includes both open and closed-ended questions and is published by the program. This content was sampled over a five-year period for the graduating student survey between 2016 and 2021. The annual faculty meeting survey is administered at the end of the event and asks faculty who attended the Fall Faculty Meeting about their experience during the event, and it includes open and closed-ended questions. This survey data was sampled over a five-year period between 2016 and 2021. Faculty training and development data includes registration and attendance activity, topics of workshops, as well as dates. This data was sampled over a two-year period between 2021 and 2022. The annual student event, Connect to Campus (C2C), includes attendance and registration data, as well as a participant survey. This data was sampled throughout September, 2022. Finally, this chapter uses data from the school-wide communication platform, Microsoft Teams, and includes student and faculty activity on the platform.

The researchers then conducted a microanalysis of the online conversation and the survey open-ended responses, and a macroanalysis of the online activity and survey closed-ended responses. This approach was chosen to examine the engagement (activity data), and sentiment (survey data) of community members. By including both types of data, this chapter can better describe how students and faculty experience and respond to the implemented sites of interaction.

Discussion

The challenge that the online programs faced was a lack of cohesion around these community-building efforts for students and faculty at the school level. Over the last 5 academic years, a graduating student survey was sent to students with two questions about community to gauge the level of community felt by its remote students and their level of desire for community in their programs of study.

1. There is a sense of community among students.
2. A sense of community is important to me.

The average of responses over the last 5 academic years revealed that only 35% of students felt there was a SoC among students, and 55% a SoC in their remote programs of study was important to them.

For faculty, a survey was sent to those who attended a faculty meeting—a bi-annual faculty event. Overall, 84% of respondents stated that "Networking" was the most useful component of the faculty meetings.

Based on the survey response, which highlighted a lack of SoC for students and a desire for faculty to network, the authors collected the efforts made to build an online CoP. Prior to the period of this study, between 2001 and 2018, the division offered select methods for students and faculty to collaborate with their peers, including:

1. **Students**
    a. Town hall: An annual town hall led by members of the school's Dean's Office. All online students were invited to attend.
    b. Curriculum-based community: Some online programs, such as the Applied Biomedical Engineering program, required onsite attendance at various points in the curriculum.
    c. Course-based community: Online courses included opportunities for interaction and community building through collaborative work, discussions, and live office hours.
2. **Faculty**
    a. Faculty meetings: A bi-annual faculty meeting that included time for socialization, dinner, presentations on teaching and learning, and a keynote speaker.
    b. Faculty development: Various faculty development events were held throughout the year to discuss, share, and learn teaching practices.
    c. Course development cohorts: Divisional teaching and learning center, consisting of instructional designers, technologists, and media experts would collaborate with faculty to create online courses that utilize best practices to foster a SoC within the specific course.
    d. Academic program meetings: Online program leadership would hold meetings for the faculty in their program to attend.

To examine the social dimensions of online students engaged in a graduate engineering program, it is necessary to understand the narratives of engaged practitioners (i.e., learners and educators) and analyze the material products of these social practices. This chapter includes two data sources: (a) surveys and (b) document analysis.

SOLUTIONS AND RECOMMENDATIONS

Before implementing changes to increase SoC in the online learning community, the planned changes were aligned with the three primary elements of a CoP. For each group, one interaction site was established to develop and initiate members into the domain and community (i.e., New Student Orientation, Faculty Forward), two were set up to facilitate open knowledge sharing and collaboration, and one was implemented to provide a site of recognition and visibility.

Table 1. Interaction site aligned with a CoP component of development

Practitioner Group	Interaction Site	Strategy	CoP Element	Evidence
Students	Program, Course	New Student Orientation	Domain, Community	Orientation site interaction, end-of-year survey, support cases
Students	Program	Student Community	Community, Practice	Student community interaction, end-of-year survey, support cases
Students	Program, course	Student Advisory Board	Community	Student advisory board interaction, program outcomes based on recommendations
Students	Program	Community Day	Community, Practice	Community day interaction, end-of-year survey
Faculty	Program, course	Faculty Community	Community, Practice	Faculty community interaction, support cases
Faculty	Course	Faculty Forward	Domain, Community	Faculty Forward interaction and completed trainings, course evaluations, support cases
Faculty	Course	Faculty Course Development Cohorts	Community, Practice	Course Development Cohort interaction, course evaluations
Faculty	Program	Faculty Meeting	Community, Practice	Faculty meeting survey, support cases

Data used for analysis includes survey responses to bi-annual faculty meetings, end-of-year graduating student surveys, community interactions and activity on the platform Microsoft Teams, orientation site activity from Blackboard and Canvas, Community Day participation and interactions, and outcomes from the student advisory board meetings.

For Students

For students, the sites of interaction include New Student Orientation, Student Community, Student Advisory Board, and Community Day. These sites of interaction are listed in the order in which they were implemented across the part-time online graduate engineering programs. The implementation order was driven by the stages of development of a CoP, which include orienting new community members with a baseline to interact (e.g., New Student Orientation) and introducing them to the community (e.g., Student Community), establishing formal spaces for visibility or recognition (e.g., Student Advisory Board), and organizing a central event for interaction (e.g., Community Day).

These implemented changes were based on core elements of the CoP framework, Moore's three types of interaction, Bloom's Taxonomy, and adult learning theory (see the Theoretical Framework section). Each provides a structure with overlapping elements: (a) required expertise and interest in the domain; (b) orientation of newcomers to the community; (c) shared resources and knowledge; and (d) shared sites of interaction. The four implemented changes below address the overlapping elements of CoP, Moore's three types of interaction, Bloom's Taxonomy, and adult learning theory.

1. **New Student Orientation**: An online student orientation that welcomes new students to the school and provides guidance on the following aspects:
    a. Getting started as a new student

   b. Academic ethics
   c. Online learning
   d. Preparing for your course
   e. Opioid and sexual harassment resources
2. **Student Community**: An online student community on a collaborative chat platform (Microsoft Teams) that includes over 1,900 active students. The community provides an opportunity for social interaction with all students and within their specific academic program, news about the school, and direct access to teaching and technology support and student services teams.
3. **Student Advisory Board**: A student advisory board provides a voice to a broad and diverse population of online learners. The advisory board advises program leadership on pressing academic and student services issues, respond to communication requests, and meets remotely with the program administration twice per academic year.
4. **Community Day**: A community day is a hybrid (in-person, virtual) conference-style event that seeks to build community among students, faculty, and alumni. Community day offerings include new student orientation, workshops, leadership town halls, resource fairs, technical talks, lab demonstrations, and networking events.

For Faculty

Four primary sites of faculty interaction and community development were implemented: Faculty Meeting, Faculty Course Development Cohorts, Faculty Community, and Faculty Forward. These sites of interaction are listed in the order in which they were implemented. The implementation order for faculty, unlike student implementation, was driven by existing processes and needs. Specifically, the bi-annual faculty meetings and course development cohorts existed but were altered in significant ways, whereas Faculty Community and Faculty Forward were entirely new ventures.

These implemented changes were informed by research from Dolan (2011), who found that part-time faculty noted three specific areas of concern: (a) lack of regular and in-depth communication with other members of the community (i.e., students, staff, other faculty); (b) lack of recognition and visibility in the community (i.e., awards, notes of appreciation); and (c) lack of professional development opportunities.

1. **Faculty Meeting**: A bi-annual faculty event that includes sessions for professional development, opportunities for networking between program faculty and staff, and annual faculty awards. Awards announced at the faculty meetings include New Instructor Award, Outstanding Instructor Award, Sustained Excellence Award, and Exceptional Online Course Design Award. The spring and fall faculty meetings address all three concerns in Dolan's (2011) study.
2. **Faculty Course Development Cohorts**: A systematic course design and development process in which faculty work collaboratively with an instructional designer and have opportunities to discuss course design, teaching, and learning practices with their faculty peers. The course development cohorts address the third concern in Dolan's (2011) study.
3. **Faculty Community**: An online faculty community on Microsoft Teams includes over 600 active faculty members. The community provides an opportunity for social interaction and sharing of teaching practices, news about the school, and direct access to the teaching and technology support team and library liaison. The faculty community addresses the first and second concerns in Dolan's (2011) study.

4. **Faculty Forward**: A faculty development program that provides opportunities for faculty to learn and engage with one another. The Faculty Forward program addresses the third concern in Dolan's (2011) study.

Group collaboration, knowledge sharing, and communication can be increased by providing spaces for interactions between learners and faculty. In this section, the authors discuss the strategies deployed in creating and sustaining a SoC for faculty and students over 10 years, from 2012 to 2022. This period of time is broken into two main phases of the community building strategy.

Phase 1 (2012–2017): Divisional Events, Curriculum and Course Design, and Support

As the school entered into online graduate education, it adopted research-supported best practices in establishing a SoC for faculty and students that included both task-driven interactions to facilitate the teaching and learning goals and socioemotional interactions to develop friendships and the social well-being of its members (Rovai, 2001). These efforts included division-wide events and establishing opportunities for interactions throughout the curriculum.

Faculty Meetings

The online graduate division offered bi-annual faculty meetings that included time for general updates, socialization, dinner, presentations on teaching and learning, and a keynote speaker. Faculty meetings are offered both remotely and in person to allow members who cannot attend in person to participate virtually.

Fall meetings are an opportunity for the administration to offer faculty development workshops designed to introduce new pedagogical opportunities and foster academic discussion among faculty attendees and presenters. Workshop presenters include members, program leadership, divisional teaching and learning centers, and faculty members who want to share knowledge with their peers. Workshop topics at previous fall faculty meetings include "Virtual Reality and Other Technologies for Enhancing Remote Education," and "The Impact of Dyslexia in Engineering: Inclusive Instructional Design Principles and Strategies." Workshops are collaborative and provide ample opportunities for faculty to interact with one another and presenters.

Spring faculty meetings provide an opportunity for individual programs to hold annual program meetings with their faculty members prior to the general faculty meeting. Through individual program meetings, program leaders review program goals, updates, faculty accomplishments, challenges, and strategies for successful teaching and learning. Spring general meetings hold space to recognize faculty excellence in teaching with the announcement of faculty award winners in the following categories:

- Exceptional Online Course Design Award
- Outstanding New Instructor Award
- Outstanding Instructor Award
- Sustained Excellence Award

Faculty who teach remotely often feel isolated from their peers, program leadership, and institutional leadership. The bi-annual faculty meetings not only focus on delivering institutional, programmatic, and

pedagogical updates to faculty that are critical to maintaining a high level of instruction, but also facilitate a SoC across the online programs and encourage cross-collaboration and support.

Curriculum Design

With the advancement of technology, programs began re-evaluating their curriculum to determine which courses or experiences could (and should) be offered online. The curriculum design plans followed the current best practices, including balance, rigor, coherence, progression, appropriate, focused, and relevant (William, 2013). The programs also included another tenet: building a SoC throughout the curriculum and within the courses.

For example, the Applied Biomedical Engineering program integrated opportunities for students to be on campus at a specific point in time and provided opportunities for hands-on learning in the labs:

You will also work alongside our colleagues who are scientists, physicians, and engineers at the world-renowned Johns Hopkins Hospital during a unique hybrid two-weekend residency course in Baltimore. Dynamic and life-saving solutions evolve from these biomedical engineering course projects, including a student who redesigned the Ebola protective suit by integrating a cooling system. In this hands-on, immersive lab experience, you will also design and build your own EKG monitor. (Johns Hopkins Engineering for Professionals, 2022a, para. 2)

Other programs, such as Engineering Management, included a live capstone session that brought all students taking the final course of the program together for one day:

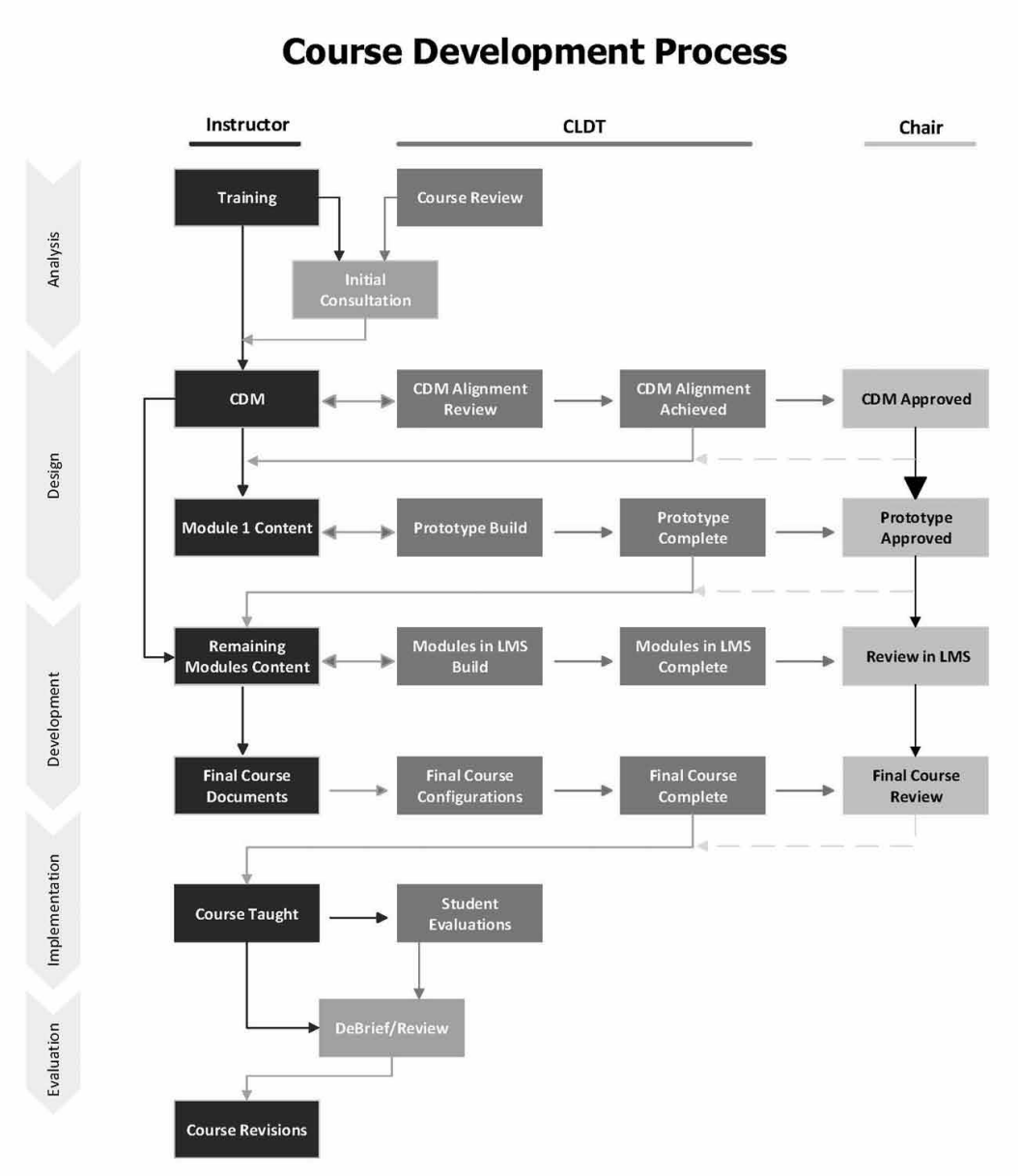
The course also includes one Saturday Capstone session in the Baltimore, MD area at the end of the semester. In-person participation with your team is encouraged. Students unable to attend in person can participate online. The Saturday session consists of student teams presenting their capstone technical strategic plan, issues, actions, and execution plans built around an evolving case study. A roundtable discussion will also be held where students have the opportunity to ask probing questions of visiting executives as part of the Capstone Day experience. (Johns Hopkins Engineering for Professionals, 2022b, para. 1)

Course Design and Development

As the division was ramping up its production of online courses, faculty, at that time, did not understand how interactions in an online course would occur. A common question from faculty when they were asked to create and teach an online course was as follows: "How can I interact with my students if I cannot see their facial expressions?"

Research indicates that following a systematic course development process and partnering faculty with instructional designers can greatly impact the overall quality of a course (Dick et al., 2015; Gagné et al., 2004; Halupa, 2019). Thus, to support faculty in implementing research-supported practices in providing opportunities for regular and substantive interaction, a course development process was provided. The course development process included partnering instructional designers with each course, following a systematic course development process (see Figure 1) and a quality review process using the QM (2011) Course Design Rubric.

Figure 1. Course development process



Phase 2: 2018–2022

To improve the SoC, the school moved into Phase 2, which focused on the following outcomes:

1. Improve how students and faculty are oriented to the school;
2. Improve communications with students and faculty; and
3. Expand opportunities for collaboration inside and outside of the course context.

Faculty Development

In 2018, the divisional teaching and learning center received a grant to fund a longer-term faculty development program, Faculty Forward Fellowship, a 4-week asynchronous online program followed by a 3-day in-person training on the Johns Hopkins University campus. The collaborative and immersive program was designed to provide an opportunity for faculty to learn from the program instructors, instructional designers, and their peers (Faculty Forward Academy, 2022). The Fellowship program marked a change in culture regarding faculty development and how faculty can establish a SoC. Figure 2 shows faculty collaborating in the faculty forward fellowship program.

The Faculty Forward Fellowship program expanded into creating more opportunities for faculty to collaborate with each other and instructional designers, including a comprehensive catalog of workshops, webinars, and online courses. The following are some examples of workshops and short courses offered through the Faculty Forward Academy.

- Designing Group Projects (workshop)
- Using Technology to Facilitate Group Projects (workshop)

Student Orientation

As the first step in the community building plan, the school launched a new student orientation course for all students in the summer of 2019. This required orientation course introduces new students to the basics of taking online courses but also presents resources, including access to the EP Student Community, which is hosted on the collaborative chat service Microsoft Teams.

For any CoP, developing an orientation for newcomers is a foundational initiation step to the community, reducing barriers to key resources and providing connection to other members (Gray, 2005). Since

Figure 2. Faculty collaborating in the faculty forward fellowship program

the launch in 2019, over 5,000 students have completed the New Student Orientation course, and 65% of these students interacted monthly in the Teams community within 30 days of completing orientation. The student orientation course included the following topics:

1. Getting Started as a New Student
2. Academic Ethics
3. Online Learning
4. Preparing for Your Course
5. Opioid and Sexual Harassment Resources

Student Community

Following the student orientation, the school created a dedicated student community on Microsoft Teams with conversation channels for each program and news and access to real-time information and assistance from the student services team. Currently, the student community includes over 1,900 active students. These students visit the community for social interaction with all students and within their specific academic program, news about the school, and direct access to the teaching and technology support and student services teams.

After analyzing data over the past 2 years, emerging usage patterns highlight the value of this community, particularly in these areas (listed by interaction frequency):

1. Student assistance through the Student Services channel
    a. Registration process or course availability
    b. Tuition and refund policies and processes
    c. Course schedule
    d. Advisory and degree audit appointments
2. Student interaction and collaboration through the Program channels
    a. Future availability of courses on particular topics
    b. Information on a course, such as an instructor and texts
    c. Program-specific events
    d. Employment and professional development opportunities

While the student orientation connects newcomers to important resources and peers, the Student Community provides a space for ongoing networking and collaboration as students progress through their program.

Faculty Community

The Faculty Community was launched at the same time as the student community and hosted on the same collaborative chat service, Microsoft Teams. Since the majority of the faculty teaching online courses are part-time and working full-time as professionals in their field, the development of a community was viewed as essential. To address this request, the authors structured the community to function at two levels:

Figure 3. Faculty discussing teaching strategies in the Faculty Community Microsoft Teams site

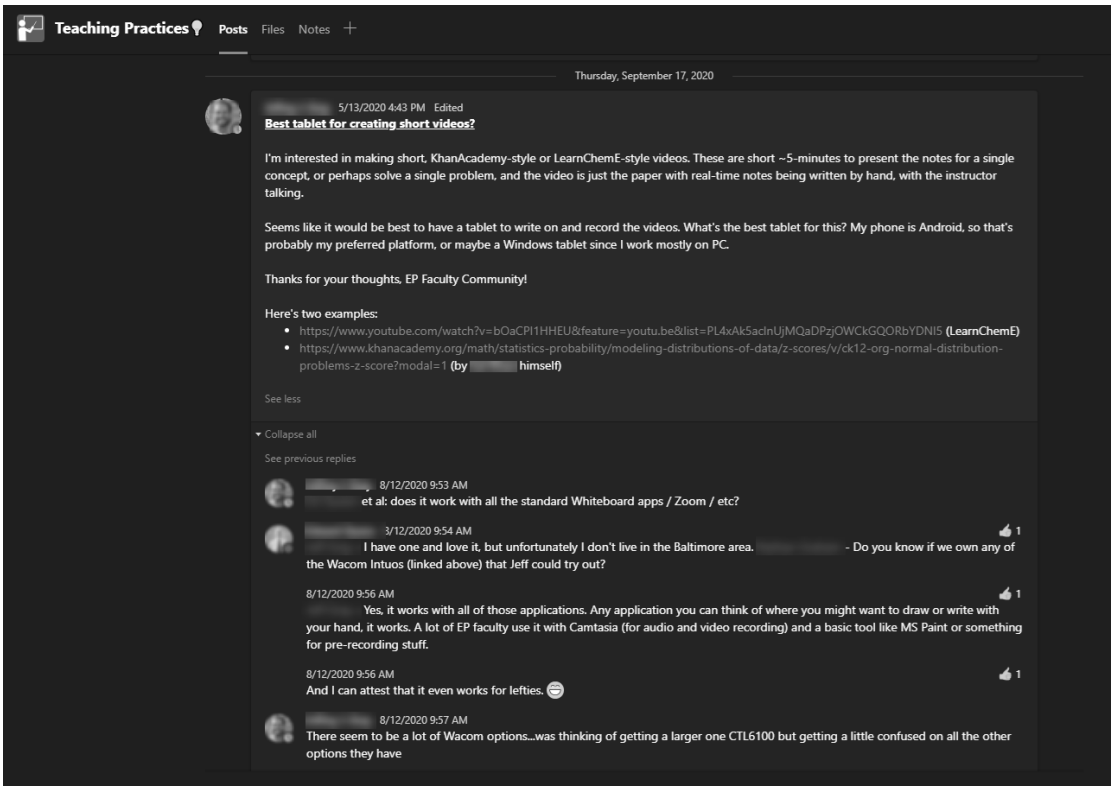
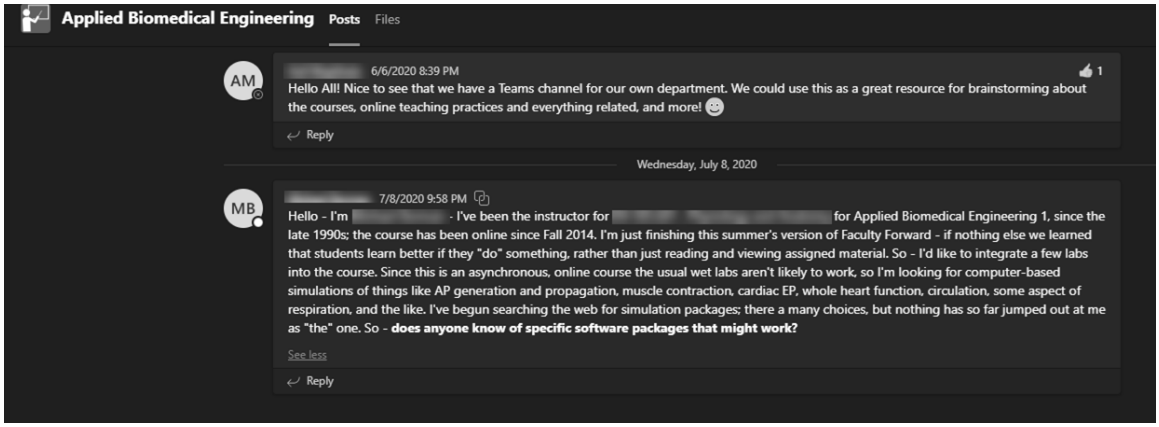


Figure 4. Faculty discussing teaching strategies in their specific program channel



1. **School-level**: Specific channels in the Faculty Community were created to provide opportunities for all faculty to hear about news and policy updates and to share and discuss teaching and learning best practices, as shown in Figure 3.
2. **Program-level**: Specific channels were also created for communication and collaboration in the specific programs, as shown in Figure 4.

Currently, over 98% of the 618 faculty are active in the Faculty Community, posting updates about events in their programs, sharing teaching best practices, and asking questions about domain-specific software and tools.

The development of the community around a common set of tools and platforms accomplished an additional goal, which was helping unify the set of tools and practices used by the larger community consisting of students, faculty, and the support teams for the development and delivery of courses, resulting in better use of the platforms and more frictionless handoff and escalation of issues that emerge in courses.

Student Advisory Board

A student advisory board is a valuable tool for academic programs to gain insights from a broad and diverse population of online learners. In addition, student advisory boards provide students and program administrators with the opportunity to form trusting relationships and build community with one another as well as the students the board represents. In 2020, the school established a student advisory board consisting of approximately 15 current students from 12 master's degree programs who are representative of the school's diverse student body in many ways. The student advisory board:

1. Provides representation for EP students;
2. Reviews proposals and makes recommendations regarding new and current academic and student services initiatives;
3. Shares curricular components of the program experience with the members of the administration team; and
4. Discusses pressing issues in graduate education and the student community.

Student advisory board members are self-nominated and must submit a letter of interest and a recent curriculum vitae to be considered for a 1-year term appointment. Members are selected by administrators through a review process that ensures the board is representative of EP students in areas of diversity (race, gender, disability, age, etc.), time in program, degree program, and student classification (e.g., international, domestic, full-time, part-time, etc.).

The student advisory board meets virtually twice per year, once in the fall and spring term, and on an ad hoc basis. Advisory board members are also active in a dedicated channel of the Microsoft Teams student community, allowing them to interact with each other and the administrators between meetings. Meeting agendas are determined by student advisory board members and members of the administration team, including academic and student affairs, course design and technology support, institutional research, and marketing. Ad hoc meetings and Microsoft Teams discussions are often utilized when a new initiative is being considered or if students are experiencing a programmatic issue that requires swift feedback or response.

Over the last 2 years, the student advisory board has provided feedback on initiatives such as the community day, a student academic success coordinator role, and professional development webinar offerings as well as academic and curricular matters such as class size, the instructor/student/TA relationship, office hours expectations, and tutoring services. As a result of these discussions with the board, the school has moved forward with the hiring process for a student success coordinator who will serve as an administrative advisor to all students, expanded its professional development webinar series to include offerings beyond technical writing, and published an office hours expectation guide for faculty. Through feedback, advocacy, and collaboration, student advisory boards provide an avenue for students to make a lasting impact on their learning communities and help bridge relationships between university administrators and students.

Connect to Campus

Student surveys conducted over 5 years revealed that only an average of 34.2% of EP students felt a SoC in their graduate programs. With the understanding that a SoC is important for retention and degree completion and with the goal of creating more community among online learners, administrators began to explore the idea of an on-campus event. In early 2022, the planning for an annual one-day conference-style event known as Connect to Campus began. Connect to Campus is designed to build community, improve student retention, and enrich student services and consists of several interactive, synchronous offerings available both in-person and via Zoom for remote attendees. The inaugural Connect to Campus event took place in early Fall 2022 and followed the agenda below:

- Welcome – Dean, Vice Dean, Associate Deans
- Program Town Halls – Program Chairs, Vice Chairs, Managers (HYBRID OPTION)
- Tech Talks – Faculty and Alumni (HYBRID OPTION)
- Lunch and Networking
- Campus Tours
- Afternoon Session 1 (students will choose one; HYBRID OPTION)
    - New Student Orientation – Academic Resources, Student Affairs Resources, Campus Support Resources
    - Alumni Panel
- Afternoon Session 2 (students will choose one; HYBRID OPTION)
    - Study Skills Workshop
    - Work, School, Life Balance Workshop
    - Resume Building Workshop
    - Leadership Workshop
    - Student Focus Groups
- Affinity Group Receptions – Students, Faculty, Program Chairs, Vice Chairs, Managers, and Alumni
- Optional Sporting Events (on and off campus)

Figure 5. Students connecting over during Lunch and Networking

Figure 6. Students connecting with department leadership during Tech Talks

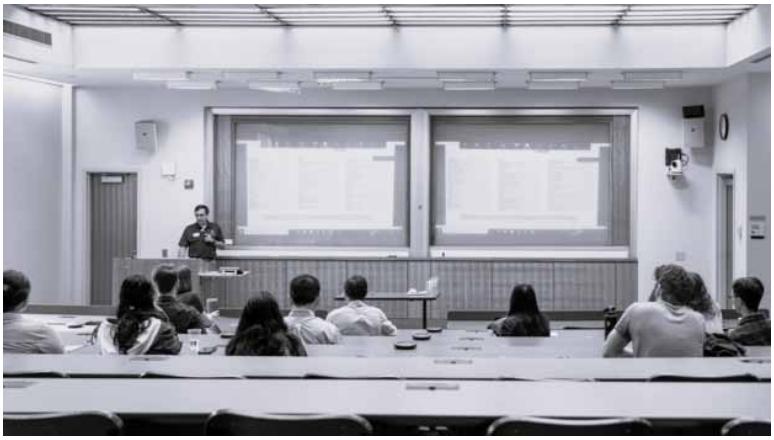


Figure 7. Students connecting with administrative staff during a Student Affairs session

Figure 8. Students connecting with the campus during the Campus Tours

FINDINGS

Through data collected from student course evaluations, engagement in the EP Student Community, EP Faculty Community, and faculty development events, the authors show a positive trend in building a SoC within a CoP. The following details demonstrate the positive trend.

Interactions in Online Courses

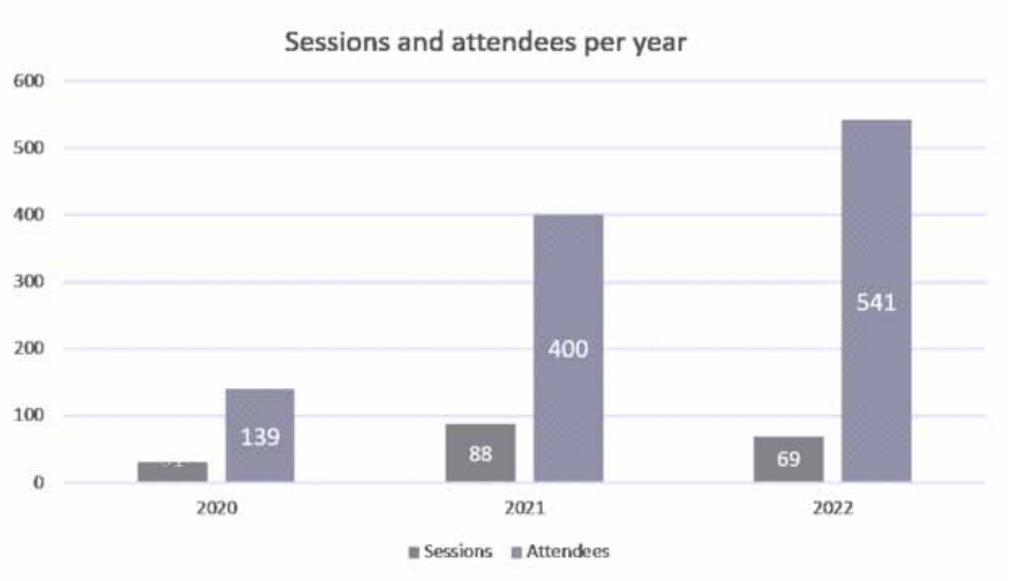
From 2014 to 2019, students were asked to evaluate their interactions in their online course by responding to the following question: "The other students' comments in the discussion forums contributed to my learning." The average score for this question was 3.83.

In 2020, the question on the survey was revised because it was deemed too narrow since discussion forums are just one form of interaction. The new question asked students, "My interaction with the other students in the course contributed to my learning." The average score from 2020 to 2021 was 3.98. This demonstrates a .15 increase in student evaluation scores for the effectiveness of interactions on their learning in an online course.

Faculty Development

Prior to the creation of the Faculty Forward Academy in 2019, a few faculty development sessions were offered per year. Attendance tracking for those events was not done. However, it is estimated that the authors offered approximately 10 sessions with 75 participants. Since 2020, the Faculty Forward Academy has offered 188 sessions with 1,080 attendees.

Figure 9. Growth of faculty development sessions offered and attendees



Student Community

The Student Community was launched on a collaborative chat platform, Microsoft Teams, on Monday, January 13, 2020, at the start of the spring semester. Between launch and the time of writing this chapter, the Student Community has grown to 1,934 active members (see Figure 5 for growth over time).

Faculty Community

The Faculty Community was launched on a collaborative chat platform, Microsoft Teams, on January 1, 2020, at the start of the spring semester. Between launch and the writing of this chapter (i.e., 28 months), the Faculty Community has grown to over 600 active members (see Figure 6 for growth over time).

Figure 10. Growth of active students in the Student Community

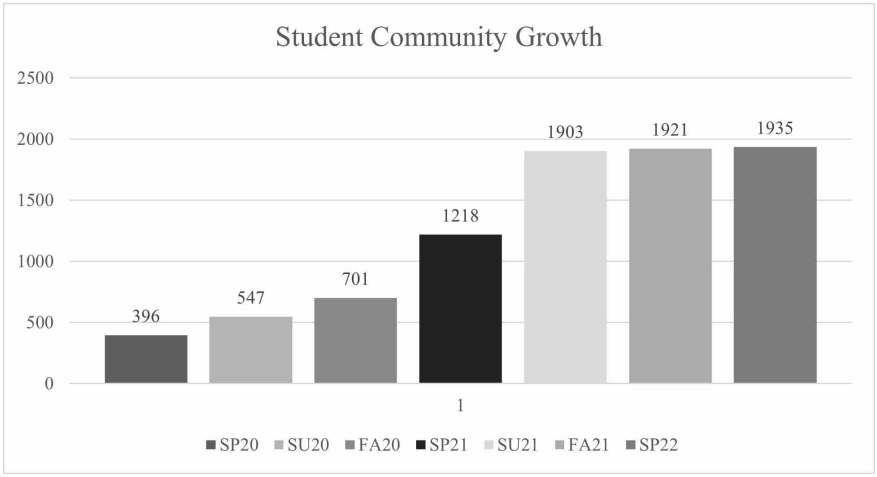
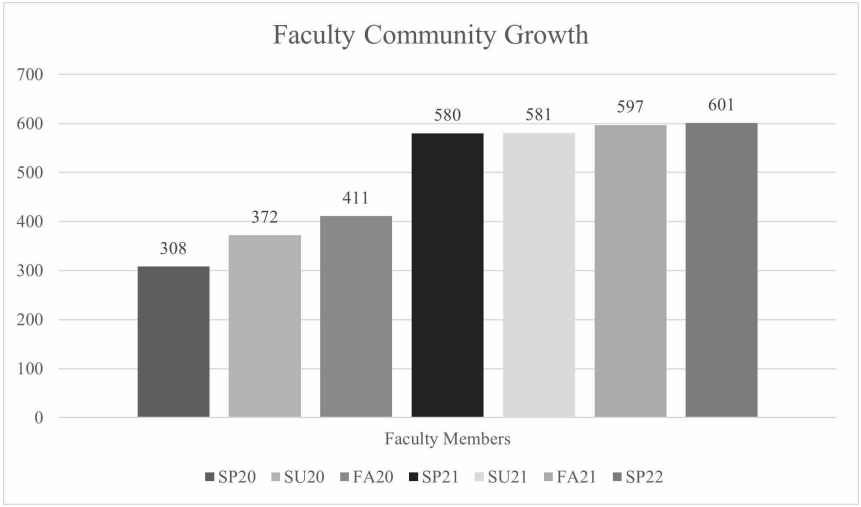


Figure 11. Growth of active faculty in the Faculty Community



Connect to Campus

During the inaugural event, administrators, faculty, and alumni hosted nearly 200 graduate students in-person and remotely. Following the event, 90% of surveyed attendees indicated that Connect to Campus increased their SoC in just one day. Additionally, 97% of surveyed attendees stated they would attend Connect to Campus in Fall 2023. Surveyed attendees provided feedback that administrators plan to incorporate in future Connect to Campus events, such as increased social networking opportunities, inviting a greater number of faculty and alumni, and building opportunities to interact more with program leadership. Administrators will continue to monitor student survey results to measure if Connect to Campus, along with other SoC building initiatives, increase the percentage of students who feel a SoC in their graduate programs overall.

MAIN TAKEAWAYS

For remote programs, the primary site of interaction is the course, which includes opportunities with the instructor(s) and peers. However, it is important that leaders of remote programs identify and implement opportunities for greater interaction at the school level. The following questions can help leaders identify appropriate and achievable strategies:

1. What does the data tell us about our existing opportunities for interaction?
2. What technology platforms can we adopt to help students and faculty connect in and out of the course?
3. What opportunities exist to connect students in a physical space, for example, the campus?
4. How can we build align and cohesion around the opportunities for interaction, for example, connecting student orientation with a virtual platform to connect upon completion?

FUTURE RESEARCH DIRECTIONS

This chapter provides specific strategies for administrators and program leadership in higher education to facilitate the development of a community of practice (CoP). Future research could examine individual components of the sites of interaction presented in this chapter, and explore the application of this approach to other groups of learners. While this chapter highlights an approach to improving sense of community (SoC) within an online graduate engineering community of students and faculty, the findings are primarily based on content analysis. The authors sought three primary areas of future research on SoC in online learning: (a) diversification of participants, (b) community-based work, and (c) the use of extended or immersive reality, which is commonly referred to as XR.

Future research could use different groups of participants (e.g., online undergraduates in a school of information), different data collection approaches (e.g., surveys of faculty and students using the Sense of Community Index measure), and different sites of observation (e.g., small, public university in the Southeast). Additionally, future research could focus on the successful implementation of pedagogical strategies such as community-based work for online learning. Since the COVID-19

pandemic, there has been renewed interest in this research space, partly due to many experiential learning courses that were typically taught onsite having to move online. Continued research in this area will provide helpful insights and strategies for increasing SoC through various opportunities for interaction within an online course. Finally, with the expansion of immersive reality technologies into education, future research could help researchers and practitioners understand the impact of immersive learning on the SoC.

CONCLUSION

The analysis of the implemented sites of interaction suggests that adding visible spaces for interaction for members of an online learning community increases SoC and supports the development of an active CoP. The planning and selection of opportunities for interaction involve taking inventory of existing platforms and resources that may be relevant to the goal, aligning the inventory with the type of interaction it may facilitate, identifying gaps, and developing a proposal to address these gaps.

ACKNOWLEDGMENT

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REFERENCES

Allen, I., & Seaman, J. (2014). *Grade change: Tracking online education in the United States*. Babson Survey Research Group and Quahog Research Group, LLC.

Allen, I. E., Seaman, J., Poulin, R., & Straut, T. T. (2016). *Online report card: Tracking online education in the United States*. Babson Survey Research Group and Quahog Research Group, LLC.

Andersen, J. C., Lampley, J. H., & Good, D. W. (2013). Learner satisfaction in online learning: An analysis of the perceived impact of learner-social media and learner-instructor interaction. *Review of Higher Education and Self-Learning*, *6*(21), 81–96.

Bart, M. (2012). *Online student engagement tools and strategies*. Magna Publications.

Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology*, *35*(1), 22–30.

Berge, Z. L. (2008). Changing instructor's roles in virtual worlds. *Quarterly Review of Distance Education*, *9*(4), 408–414.

Berry, S. (2017). *Exploring community in an online doctoral program: A digital case study* (Publication No. 10257431) [Doctoral dissertation, University of Southern California]. ProQuest Dissertations & Theses Global.

Brooks, C. D., & Jeong, A. (2006). Effects of pre-structuring discussion threads on group interaction and group performance in computer-supported collaborative argumentation. *Distance Education*, *27*(3), 371–390. doi:10.1080/01587910600940448

Cheng, C., Paré, D., Collimore, L., & Joordens, S. (2011). Assessing the effectiveness of a voluntary online discussion forum on improving students' course performance. *Computers & Education*, *56*(1), 253–261. doi:10.1016/j.compedu.2010.07.024

Collins, R. (2004). *Interaction ritual chains*. Princeton University Press. doi:10.1515/9781400851744

Cox, B., & Cox, B. (2008). Developing interpersonal and group dynamics through asynchronous threaded discussions: The use of discussion board in collaborative learning. *Education*, *128*(4), 553–565.

Cox, M. (2001). Faculty learning communities: Change agents for transforming institutions into learning organizations. In D. Lieberman & C. Wehlburg (Eds.), *To Improve the Academy* (Vol. 19). Anker.

Cranton, P. (1994). *Understanding and promoting transformative learning: A guide for educators of adults*. Jossey-Bass.

Creswell, J. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Sage.

Darabi, A., & Jin, L. (2013). Improving the quality of online discussion: The effects of strategies designed based on cognitive load theory principles. *Distance Education*, *34*(1), 21–36. doi:10.1080/01587919.2013.770429

Davies, J., & Graff, M. (2005). Performance in e-learning: Online participation and student grades. *British Journal of Educational Technology*, *36*(4), 657–663. doi:10.1111/j.1467-8535.2005.00542.x

De Miranda, M. A. (2004). The grounding of a discipline: Cognition and instruction in technology education. *International Journal of Technology and Design Education*, *14*(1), 61–77. doi:10.1023/B:ITDE.0000007363.44114.3b

Delahunty, J., Verenikina, I., & Jones, P. (2014). Socio-emotional connections: Identity, belonging and learning in online interactions. A literature review. *Technology, Pedagogy and Education*, *23*(2), 243–265. doi:10.1080/1475939X.2013.813405

DeLoach, S. B., & Greenlaw, S. A. (2007). Effectively moderating electronic discussions. *The Journal of Economic Education*, *38*(4), 419–434. doi:10.3200/JECE.38.4.419-434

deNoyelles, A., Zydney, J. M., & Chen, B. (2014). Strategies for creating a community of inquiry through online asynchronous discussions. *Journal of Online Learning and Teaching*, *10*(1), 153–165.

Dick, W., Carey, L., & Carey, J. O. (2015). *The systematic design of instruction* (8th ed.). Pearson.

Dolan, V. (2011). The isolation of online adjunct faculty and its impact on their performance. *International Review of Research in Open and Distance Learning*, *12*(2), 62–77. doi:10.19173/irrodl.v12i2.793

Du, J., Yu, C., & Olinzock, A. (2011). Enhancing collaborative learning: Impact of "question Prompts" design for online discussion. *Delta Pi Epsilon Journal*, *53*(1), 28–41.

Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: implications for the design and delivery of instruction. In D. Jonassen (Ed.), *Handbook of research on educational communications and technology* (1st ed., pp. 1–31). Routledge/Taylor & Francis Group.

Dziuban, C., Moskal, P., Kramer, L., & Thompson, J. (2013). Student satisfaction with online learning in the presence of ambivalence: Looking for the will-o'-the-wisp. *Internet and Higher Education*, *17*, 1–8. doi:10.1016/j.iheduc.2012.08.001

Eagan, M. K., & Jaeger, A. J. (2008). Closing the gate: Part-time faculty instruction in gatekeeper courses and first-year persistence. *New Directions for Teaching and Learning*, *2008*(115), 39–53. doi:10.1002/tl.324

Ehrenberg, R. G., & Zhang, L. (2005). Do tenured and tenure-track faculty matter? *The Journal of Human Resources*, *40*(3), 647–659. doi:10.3368/jhr.XL.3.647

Engage, C. (2022). *Community engaged teaching and learning*. https://www.campusengage.ie/our-work/making-an-impact/community-engaged-teaching-and-learning

Ertmer, P. A., Richardson, J. C., Belland, B., Camin, D., Connolly, P., Coulthard, G., Lei, K., & Mong, C. (2007). Using peer feedback to enhance the quality of student online postings: An exploratory study. *Journal of Computer-Mediated Communication*, *12*(2), 412–433. doi:10.1111/j.1083-6101.2007.00331.x

Faculty Forward Academy. (2022). *Fellowship*. https://facultyforward.jhu.edu/fellowship

Fairclough, N. (2001). Critical discourse analysis as a method in social scientific research. In R. Wodak & M. Meyer (Eds.), *Introducing qualitative methods: Methods of critical discourse analysis* (pp. 121–138). SAGE Publications Ltd.

Finegold, A., & Cooke, L. (2006). Exploring the attitudes, experiences and dynamics of interaction in online groups. *The Internet and Higher Education*, *9*(3), 201–215. doi:10.1016/j.iheduc.2006.06.003

Foshay, W., Silber, K., & Westgaard, O. (1986). *Instructional Design Competencies: The Standards*. International Board of Standards for Training, Performance and Instruction.

Gagné, R. M., Wager, W. W., Golas, K. C., Keller, J. M., & Russell, J. D. (2004). *Principles of instructional design* (5th ed.). Wadsworth Publishing Company.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, *15*(1), 7–23. doi:10.1080/08923640109527071

Giles, D., Stommel, W., Paulus, T., Lester, J., & Reed, D. (2015). Microanalysis of online data: The methodological development of "digital CA". *Discourse, Context & Media, 7*, 45-51.

Goggins, J., & Hajdukiewicz, M. (2020). *Community-engaged learning: A building engineering case study*. https://sword.cit.ie/cgi/viewcontent.cgi?article=1069&context=ceri

Gray, B. (2005). Informal learning in an online community of practice. *International Journal of E-Learning & Distance Education*, *19*(1), 20–35.

Halupa, C. (2019). Differentiation of roles: Instructional designers and faculty in the creation of online courses. *International Journal of Higher Education*, *8*(1), 55–68. doi:10.5430/ijhe.v8n1p55

Han, J., Jiang, Y., Mentzer, N., & Kelley, T. (2022). The role of sense of community and motivation in the collaborative learning: An examination of the first-year design course. *International Journal of Technology and Design Education*, *32*(3), 1837–1852. doi:10.100710798-021-09658-6

Hatcher, J. A., & Bringle, R. G. (2010). Reflection: Bridging the gap between service and learning. *College Teaching*, *45*(4), 153–158. doi:10.1080/87567559709596221

Herring, S. (1999). Interactional coherence in CMC. *Journal of Computer-Mediated Communication*, *4*(4), 0. Advance online publication. doi:10.1111/j.1083-6101.1999.tb00106.x

International Technology and Engineering Educators Association. (2020). *Standards for technological and engineering literacy: Defining the role of technology and engineering in STEM education*. Author.

Jacobs, S., Mishra, C. E., Doherty, E., Nelson, J., Duncan, E., Fraser, E. D., Hodgins, K., Mactaggart, W., & Gillis, D. (2021). Transdisciplinary, community-engaged pedagogy for undergraduate and graduate student engagement in challenging times. *International Journal of Higher Education*, *10*(7), 84–95. doi:10.5430/ijhe.v10n7p84

Jacoby, D. (2006). Effects of part-time faculty employment on community college graduation rates. *The Journal of Higher Education*, *77*(6), 1081–1103. doi:10.1353/jhe.2006.0050

Jaeger, A. J., & Eagan, M. K. (2011). Examining retention and contingent faculty use in a state system of public higher education. *Educational Policy*, *25*(3), 507–537. doi:10.1177/0895904810361723

Järvelä, S., Järvenoja, H., & Veermans, M. (2008). Understanding the dynamics of motivation in socially shared learning. *International Journal of Educational Research*, *47*(2), 122–135. doi:10.1016/j.ijer.2007.11.012

Jeong, A. (2004). The combined effects of response time and message content on growth patterns of discussion threads in computer supported collaborative argumentation. *Journal of Distance Education*, *19*(1), 36–53.

Jinhong, J., & Gilson, T. A. (2014). Online threaded discussion: Benefits, issues, and strategies. *Kinesiology Review (Champaign, Ill.)*, *3*(4), 241–246. doi:10.1123/kr.2014-0062

Johns Hopkins Engineering for Professionals. (2022a). *Applied Biomedical Engineering Master's Program Online*. Johns Hopkins Engineering Online. https://ep.jhu.edu/programs/applied-biomedical-engineering

Johns Hopkins Engineering for Professionals. (2022b). *Executive Technical Leadership Online*. Johns Hopkins Engineering Online. https://ep.jhu.edu/programs/engineering-management

Jones, A., & Issroff, K. (2005). Learning technologies: Affective and social issues in computer-supported collaborative learning. *Computers & Education*, *44*(4), 395–408. doi:10.1016/j.compedu.2004.04.004

Kay, R. H. (2006). Developing a comprehensive metric for assessing discussion board effectiveness. *British Journal of Educational Technology*, *37*(5), 761–783. doi:10.1111/j.1467-8535.2006.00560.x

Kehrwald, B. (2008). Understanding social presence in text-based online learning environments. *Distance Education*, *29*(1), 89–106. doi:10.1080/01587910802004860

Kim, T. L., Wah, W. K., & Lee, C, T. A. (2007). Asynchronous electronic discussion group: Analysis of postings and perception of inservice teachers. *Turkish Online Journal of Distance Education*, *8*(1), 33–41.

Knowles, M. S. (1984). *The adult learner: A neglected species* (3rd ed.). Gulf Publishing Co.

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, *41*(4), 212–218. doi:10.120715430421tip4104_2

Kupczynski, L., Mundy, M.-A., & Maxwell, G. (2012). Faculty perceptions of cooperative learning and traditional discussion strategies in online courses. *Turkish Online Journal of Distance Education*, *13*(2), 84–95.

Lave, J. (1991). Situating learning in communities of practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 63–82). American Psychological Association. doi:10.1037/10096-003

Lee, K. (2007). Online collaborative case study learning. *Journal of College Reading and Learning*, *37*(2), 82–100. doi:10.1080/10790195.2007.10850199

Mager, R. F. (1997). *Preparing Instructional Objectives*. Center for Effective Performance.

Magnuson, C. (2005). Experiential learning and the discussion board: A strategy, a rubric, and management techniques. *Distance Learning*, *2*(2), 15–20.

Marinoni, G., van't Land, H., & Jensen, T. (2020). *The impact of Covid-19 on higher education around the world*. International Association of Universities. https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf

Marzano, R. J. (Ed.). (2009). *On excellence in teaching*. Solution Tree Press.

Masters, K., & Oberprieler, G. (2004). Encouraging equitable online participation through curriculum articulation. *Computers & Education*, *42*(4), 319–332. doi:10.1016/j.compedu.2003.09.001

Matters, Q. (2011). *The Quality Matters higher education rubric.* https://www.qualitymatters.org

Matters, Q. (2013). *Rubric and standards*. https://www.qualitymatters.org/rubric

McGinty, A. S., Justice, L., & Rimm-Kaufman, S. E. (2008). Sense of school community for preschool teachers serving at-risk children. *Early Education and Development*, *19*(2), 361–384. doi:10.1080/10409280801964036

McIntosh, S., Braul, B., & Chao, T. (2003). A case study in asynchronous voice conferencing for language instruction. *Educational Media International*, *40*(1-2), 63–74. doi:10.1080/0952398032000092125

Mclsaac, M. S., Blocher, J. M., Mahes, V., & Vrasidas, C. (1999). Student and teacher perceptions of interaction in online computer-mediated communication. *Educational Media International*, *36*(2), 121–131. doi:10.1080/0952398990360206

McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, *14*(1), 6–23. doi:10.1002/1520-6629(198601)14:1<6::AID-JCOP2290140103>3.0.CO;2-I

McNeil, R. C. (2011). A Program Evaluation Model: Using Bloom's Taxonomy to Identify Outcome Indicators in Outcomes-Based Program Evaluations. *Journal of Adult Education*, *40*(2), 24–29.

Mentzer, N. (2014). Team Based Engineering Design Thinking. *Journal of Technology Education*, *25*(2), 52–72. doi:10.21061/jte.v25i2.a.4

Meyer, K. A. (2014). Student engagement in online learning: What works and why. *ASHE Higher Education Report*, *40*(6), 1–114. doi:10.1002/aehe.20018

Milliman, J., Czaplewski, A. J., & Ferguson, J. (2003). Workplace spirituality and employee work attitudes: An exploratory empirical assessment. *Journal of Organizational Change Management*, *16*(4), 426–447. doi:10.1108/09534810310484172

Moore, M. (1989). Editorial: Three types of interaction. *American Journal of Distance Education*, *3*(2), 1–7. doi:10.1080/08923648909526659

Muilenburg, L. Y., & Berge, Z. L. (2002). Designing discussion for the online classroom. In *Designing instruction for technology-enhanced learning* (pp. 100–113). IGI Global. doi:10.4018/978-1-930708-28-0.ch006

Murphy, K. L., & Cifuentes, L. (2001). Using Web tools, collaborating, and learning online. *Distance Education*, *22*(2), 285–305. doi:10.1080/0158791010220207

Online Learning Consortium. (2014). *Quality scorecard for administration of online programs*. https://onlinelearningconsortium.org/consult/quality-scorecard

Online Learning Consortium. (2022). *Quality framework*. https://onlinelearningconsortium.org/about/quality-framework-five-pillars

Oregon State University. (2022). *Ecampus essentials*. https://ecampus.oregonstate.edu/faculty/courses/Best_Practices_Online_Course_Design.pdf

Paquin, J. L. (2006). *How service-learning can enhance the pedagogy and culture of engineering programs at institutions of higher education: A review of the literature*. University of Nebraska Omaha. https://digitalcommons.unomaha.edu/slcedt/19/

Redmon, R. J., & Burger, M. (2004). WEB CT discussion forums: Asynchronous group reflection of the student teaching experience. *Curriculum and Teaching Dialogue*, *6*(2), 157–166.

Reeves, T., & Gomm, P. (2015). Community and contribution: Factors motivating students to participate in an extra-curricular online activity and implications for learning. *E-Learning and Digital Media*, *12*(3–4), 391–409. doi:10.1177/2042753015571828

Reilly, J. R., Vandenhouten, C., Gallagher-Lepak, S., & Ralston-Berg, P. (2012). Faculty development for e-learning: A multi-campus community of practice (COP) approach. *Journal of Asynchronous Learning Networks*, *16*(2), 99–110. doi:10.24059/olj.v16i2.249

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education*, *14*(2), 50–71.

Rovai, A. P. (2001). Building classroom community at a distance: A case study. *Educational Technology Research and Development*, *49*(4), 33–48. doi:10.1007/BF02504946

Rovai, A. P. (2002). Building sense of community at a distance. *International Review of Research in Open and Distance Learning*, *3*(1), 1–16. doi:10.19173/irrodl.v3i1.79

Royal, M. A., & Rossi, R. J. (1996). Individual-level correlations of sense of community: Findings from workplace and school. *Journal of Community Psychology*, *24*(4), 395–416. doi:10.1002/(SICI)1520-6629(199610)24:4<395::AID-JCOP8>3.0.CO;2-T

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Survey Research Group. https://onlinelearningsurvey.com/reports/gradeincrease.pdf

Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *The Internet and Higher Education*, *9*(3), 175–190. doi:10.1016/j.iheduc.2006.06.005

Sherer, P. D., Shea, T. P., & Kristensen, E. (2003). Online communities of practice: A catalyst for faculty development. *Innovative Higher Education*, *27*(3), 183–194. doi:10.1023/A:1022355226924

Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education Communication and Information*, *2*(1), 23–49. doi:10.1080/1463631022000005016

Swan, K., & Shih, L. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks*, *9*(3), 115–136. https://olj.onlinelearningconsortium.org/index.php/olj/article/view/1788

Walker, C. H. (2016). *The correlation between types of instructor-student communication in online graduate courses and student satisfaction levels in the private university setting* [Doctoral dissertation]. Carson-Newman University. https://classic.cn.edu/libraries/tiny_mce/tiny_mce/plugins/filemanager/files/Dissertations/Christy_Walker.pdf

Weltzer-Ward, L., Baltes, B., & Lynn, L. K. (2009). Assessing quality of critical thought in online discussion. *Campus-Wide Information Systems*, *26*(3), 168–177. doi:10.1108/10650740910967357

Wenger, E. C. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press. doi:10.1017/CBO9780511803932

Wenger, E. C. (2011). *Communities of practice: A brief introduction*. University of Oregon. http://hdl.handle.net/1794/11736

Wenger, E. C., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Harvard Business School Press.

Wenger, E. C., & Snyder, W. M. (2000). Communities of practice: The organizational frontier. *Harvard Business Review*, *78*(1), 139–145. https://hbr.org/2000/01/communities-of-practice-the-organizational-frontier

Wiliam, D. (2013). *Principled curriculum design*. SSAT (The Schools Network) Limited.

Williams, S., Jaramillo, A., & Pesko, J. (2015). Improving depth of thinking in online discussion boards. *Quarterly Review of Distance Education*, *16*(3), 45–66.

Yarbrough, J. R. (2018). Adapting adult learning theory to support innovative, advanced, online learning—WVMD model. *Research in Higher Education*, *35*, 1–15.