SENSE OF COMMUNITY AND PEER REVIEW: A CASE STUDY OF A DOCTORAL
DISSERTATION EXPERIENCE

BY

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DISSERTATION

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ABSTRACT

The traditional doctoral dissertation process can be considered an isolating and challenging experience, but the extent to which this may be true for online-only students is unknown. The objective of the present study was to understand whether participation in peer review activities related to feelings of sense of community in online doctoral students. The relationship between sense of community and peer review assignments was measured using a fully online Doctor of Education program at a large, research-based university in the midwestern United States as the case study. A mixed-methods exploratory, intrinsic case study was deployed using surveys, focus group interviews, and system-captured peer review data. This study demonstrated that sense of community persists while deploying a peer review process for doctoral dissertation students as a part of a peer-to-peer learning model. The present study also revealed certain program and peer review factors as the constitutive elements of sense of community that contribute to a suggested framework of a peer review process for doctoral dissertation students, such as synchronous group advising sessions and peer research groups. Recommendations as a result of the present study also included a focused peer review assignment methodology that establishes an intimate peer learning community that can strengthen students' sense of community and ultimately their task outcomes.

ACKNOWLEDGEMENTS

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1.1 Study Rationale

The doctoral dissertation experience has traditionally been described as lonely or isolating, frustrating, and discouraging (Berry, 2017; Marx, 2011). Doctoral students report that feeling they are part of a community is important to them (Berry; Deshpande, 2016; Grady, 2016; Shea, 2006). One might reasonably assume that the mere nature of being a doctoral dissertation student automatically places oneself within a community, even if not formalized or recognized. Wenger, McDermott, and Snyder (2002) would consider this a shared practice, domain, and community. Consequently, an opportunity is presented to establish a sense of community and feel that one has a meaningful role in the process beyond just oneself. Berry states, "While doctoral students are traditionally impacted by relationships with faculty and professional leaders, findings suggest that online doctoral students are sustained mostly by their experiences with peers" (p. 44).

The *Peer Review* is regarded by some not only as a path to publication, but also as a strategy for learning and assessment, including writing improvement (Aghaee & Hansson, 2013; Baker, 2016; Pozzi, Ceregini, Ferlino, & Persico, 2016), language learning (Guardado & Shi, 2007), higher level thinking (Vista, Care, & Griffin, 2015), increased self-reflection (Zhang, Schunn, & Baikadi, 2017), greater confidence (Hojeij & Baroudi, 2018), evaluation skills (Philippakos, 2017), and/or enhanced subject matter knowledge (Burke Moneypenny, Evans, & Kraha, 2018). The literature, however, does not adequately address how peer review is influenced by or how it influences sense of community.

1.2 Purpose, Research Questions, and Theory

The purpose of the present study was to investigate the relationship between sense of community and peer review in a peer-to-peer learning model for doctoral dissertation students. The study also intended to identify program or peer review factors associated with sense of community.

Research Questions

Research Question 1: What is the relationship between sense of community and peer review practices for doctoral dissertation students?

Research Question 2: What program and peer review factors emerge as the constitutive elements of sense of community?

Theory

Sense of Community (Rovai, 2002) and New Learning (Kalantzis & Cope, 2012) both support a collaborative, peer-to-peer learning paradigm, including peer review, and serve as the theoretical foundation of the present study.

1.3 Significance

The significance of the present study is that it aims to fill a gap in the literature by examining factors that may influence peer review effectiveness and task outcomes that haven't been examined in the same way in previous studies. Additionally, it addresses the doctoral dissertation student audience, which hasn't been the focus of very many peer review-related studies. As online doctoral programs continue to emerge and the volume of graduate students increases, the overall hypothesis of this study is that both sense of community and peer collaboration will be critical elements to the success of the students and the viability of the program. The present study became even more relevant during the COVID-19 pandemic when many on-campus doctoral students were unable to complete their dissertation while on-site with their advisor. It may also be the case that an effective peer review process can contribute to a sustainable support model for high student-to-faculty ratios.

For online or on-campus doctoral programs, this study strives to understand the ways in which sense of community and the peer review process relate to one another. Ultimately, the present study aims to provide the evidence to develop a framework for deploying a peer review process for doctoral dissertation students supported by a peer-to-peer learning model.

1.4 Methodology Summary and Research Plan

The present study deployed a mixed-methods, exploratory, intrinsic case study by leveraging multiple data sources. Quantitative strategies were used to identify trends and relationships, while qualitative methods were used to capture data, including sentiments and specific quotes from study participants, that may not be evident from the quantitative data.

The present study formally began in January 2020 for a period of twelve months, with historical data from September 2018 through January 10, 2021 in order to capture longitudinal data. Participants for the present study came from a specific online Doctor of Education program at the University of Illinois at Urbana-Champaign, a large research-based university in the midwestern United States.

CHAPTER 2: REVIEW OF THE LITERATURE

Historically, in educational settings, learners have relied on instructors for authoritative feedback (Hojeij & Baroud, 2018). However, collaborative, peer-to-peer learning is becoming more common as learning professionals innovate and technology becomes more ubiquitous (Cope & Kalantzis, 2014). The review of the literature concludes that its administration and perceived value vary significantly and emanates from the purpose, instructional design, and engagement with learners.

This review will focus first on the challenges of peer review in higher education and second, on peer review design elements grouped into the following themes:

1. Administration, Logistics, and Rubrics
2. Scaffolding, Training, and Instructor Involvement
3. Self-Reflection and Accountability

While the literature demonstrates that the peer review process is common within academic journals (Cope & Kalantzis, 2014; Kumar, Rafiq, & Imam, 2011) and a variety of educational settings, this literature review will focus specifically on peer reviews in higher education and their pedagogical potential. The purpose of this literature review is to present current research which addresses the challenges and design elements of the peer review process in higher education and to provide a rationale for examining the factors that may contribute to learners' sense of community, perceptions, and motivation, and ultimately the quality of the peer review.

2.1 Definitions and Purposes

Within the discipline of assessment and feedback, the terms and definitions are numerous. And many terms refer to additional terms that must be defined. For example, peer review may be a part of either a formative and/or summative assessment process, and the overall process may include a 360*-review approach including instructors, peers, employers, and/or oneself.

It is necessary to begin with clarity on the definition of assessment, feedback, and peer review relied upon throughout this literature review. It is also important as one reads the existing literature to discern the definition and purpose implied regardless of the terminology used. Armstrong & Paulson (2008) call attention to the immense variance in definitions and purpose and argue that all peer review processes cannot be created equal. The next section examines the terms analyzed within Armstrong and Paulson's article along with terms used across the literature of feedback, assessment, peer feedback, and peer review.

2.1.1 General Terms and Definitions

There are several general terms that relate to the peer review process. A definition for **feedback** cited in Nicol and Milligan (2007) says, "good quality external feedback is information that helps students troubleshoot their own performance and self-correct; that is it helps the students take action to reduce the discrepancy between their intentions and the resulting effects" (Nicol and Macfarlane-Dick, in press). Feedback cannot always be implied as a two-way process. Boud and Molloy (2013) claim that the term "feedback" could be equated to "telling", instead of a more collaborative and discursive dialogue that involves the students in "making their own judgments" (p. 701). Wilson, Diao, and Huang (2015) warn that peer learning, peer feedback, and peer assessment should not be considered mutually exclusive, and that each is an acquired skill.

Evaluation and **assessment** are sometimes used interchangeably and may refer to judgment and outcomes (Lam, 2010) or a grade or judgment based on a set of criteria or standards (Nicol & Milligan, 2006), while Sadeghi and Abolfazli Khonbi (2015) suggest that assessment should be formative that goes beyond tests or ratings. The majority of the literature where the term assessment is used, such as in Barst, Brooks, Cempellin, and Kleinjan (2011) is not specifically defined, but implies a combination of ratings and comments, while Kilis and Yıldırım (2018) are more explicit and consider assessment being "based on both formative and summative evaluation methods" (p. 58).

Formative feedback, assessment, or evaluation are generally defined by the literature as occurring in order to improve the final result (Prasad & Kumar, 2018), whereas Massman (2013) claims that summative is typically intended to be the final result. In spite of the generally accepted distinction between formative and summative, Boud and Malloy (2013) disagree somewhat by suggesting that even summative feedback should have the purpose of improvement, and is therefore still formative, as the feedback is applied to future work. Bose and Rengel (2009) established a model, as outlined in Figure 1 that illustrates the progression for an individual as they achieve higher self-regulated learning through multiple formative assessment processes, including a formative peer assessment.

2.1.2 Definitions and Terminology of Peer Review in Higher Education

An aggregated definition of peer review from various sources follows:
Peer Review: *A formative and collaborative, recursive process that may result in reflection, accountability, learning, change, and/or improvement* (Armstrong & Paulson, 2008; Boud & Molloy, 2013; Herrington & Cadman, 1991; Moore & Teather, 2013).
Several terms or definitions are found throughout the literature, including:

1. ***Peer-to-Peer Learning*** generally refers to a collaborative approach to learning, with an emphasis on improvement, generating ideas, and solving problems (Hwang, Chen, Shadiev, & Li, 2011)

2. ***Peer Review*** may refer to formative feedback that focuses on improvement of author and/or reviewer rather than a grade (Brill, 2016)

3. ***Peer Editing*** may refer to proofreading (Mawlawi Diab, 2016), while other researchers may use that same term to refer to reviewing and analyzing (Hojeij & Baroudi, 2018)

4. ***Peer Response*** may refer to reaction-based feedback (Armstrong & Paulson, 2008)

5. ***Peer Assessment*** may refer to summative feedback with ratings and/or comments (Wen & Tsai, 2006), while others consider it a grading-related mechanism that includes a peer review element (Tornwall, 2018).

6. ***Peer Evaluation*** may refer to judgment rather than suggestions for improvement (Lam, 2010)

7. ***Reciprocal Peer Evaluation (RPE)*** may refer to participants both giving and receiving evaluations (Cho & Schunn, 2018). This qualifying term brings to light that all "peer review" or "peer evaluation" processes may not always include the author as reviewer.

8. ***Expert-based Evaluation Systems*** generally rely on instructors and/or other experts in the discipline (Cho & Schunn, 2018).

9. ***Intellectual Teamwork and Co-Problem Solvers*** (Henry & Ledbetter, 2011), refers to the authors and reviewers and implies a higher caliber of work beyond that of proofreading

10. ***Peer Coaching vs. Correcting*** may refer to guidance and suggestions vs. identifying specific mistakes (Barst et al. 2011)

11. ***360-Degree Feedback*** refers to feedback from multiple parties including instructors, peers, and self. In a workplace setting this may include direct reports, supervisors, customers, etc. (Mahar & Strobert, 2010).

These multiple ways of defining peer review processes and peer feedback in education pose a key challenge to its adoption within higher education curricula due to misperceptions and misunderstandings (Armstrong & Paulson, 2008). In addition, the notion of peer review in higher education is colored in meaning by its presumed definition associated with peer review of academic journals (Mulligan, Hall, & Raphael, 2013). For example, "peer review in science can be defined as the advice about proposed actions solicited by decision makers from experts in relevant technical areas" (Kaspar, 2017, abstract), which the authors claim implies an expectation of pre-determined expertise. To further support this concern, Wilson et al. (2015) acknowledge that the term used and the purpose conveyed is what will influence students' perception, motivation, and self-regulated learning.

Not only does the literature on peer review reveal multiple definitions for peer review, the next section will demonstrate that its deployment as a strategy and its purposes also vary greatly.

2.1.3 Application Across Disciplines

The review of the literature reveals that peer review is used in a diverse range of disciplines and types of assignments within higher education. Specific findings and implications are addressed throughout the remainder of this literature review.

The peer review process has been studied in a variety of higher education course subjects including Anthropology (Herrington & Cadman, 1991), Chemistry (Zare, Cox, Murphy, & Bayas, 2017), Humanities (Barst et al., 2011), Instructional Design (Brill, 2016), Elementary Number Theory (Ernst, Hodge, & Schultz, 2015), Language learning (Hojeij & Baroudi, 2018; Leijen, 2017; Mawlawi Diab, 2016); Mathematics (Eaton & Wade, 2014), Nursing (Johnson, Archibald, & Tenenbaum, 2010; Tornwall, 2018), Physics (Foote & Martino, 2018), Psychology (Zhang et al., 2017), Research Methods (Crowe, Silva, & Ceresola, 2015), Sociology (Baker, 2016) , Writing (Henry & Ledbetter, 2011; Lam, 2010; Selfe & Hawisher, 2012; Vasileiou, 2016), Science journalism (Tuten & Temesvari, 2013), Social Studies (Moore & Teather, 2013), Teacher Training (Salajan, Nyachwaya, Hoffman, & Hill, 2016), and Thesis Writing (Aghaee & Hansson, 2013), to name a few.

These case study examples are not limited to formal writing assignments or your traditional research paper or essay, but include lab assignments (Foote & Martino, 2018; Zare et al., 2017), theorems (Ernst et al., 2015), field notes, product-based deliverables, such as a lesson plan or marketing storyboard, an oral presentation, or informal writing, such as a wiki (Cope & Kalantzis, 2013; Fresco-Santalla & Hernández-Pérez, 2014; Salajan et al., 2016), or a public or private course blog entry (Lam, 2010; Vasileiou, 2016). The findings across each of these studies have not been dependent on the discipline, but rather the implementation. For example, Burke Moneypenny et al. (2018) studied outcomes across a variety of subjects where students participated in an online course that included a peer review and found that students preferred detailed, written feedback rather than simple ratings.

Design elements and implementation practices referenced in the literature reviewed include, but are not limited to the following:

- Open or anonymous authors and reviewers
- Single or multiple rounds of review
- Single or multiple reviewers
- Authors as reviewers
- Frequency/quantity of reviews
- Timing of the reviews
- Self, Peer, teaching assistant, and/or instructor review
- Technology-assisted or paper and pen
- Ratings and/or comments

- The use of dialogue and whether written or verbal
- Assessing the review
- Modeling, scaffolding, and/or training
- Rubrics
- Review for improvement or review for assessment

2.1.4 Purpose and Benefits of Peer Review in Higher Education

The majority of the literature reviewed cites benefits of the peer review process. Improved writing skills is a key finding across some of the literature (Pearce, Mulder, & Baik, 2009; Tuten & Temesvari, 2013), especially in courses focused on composition and journalism. Several studies found that students were more engaged, improved their own work, and had more substantive revisions as a result of reviewing a peer's work (Henry & Ledbetter, 2011; Philippakos, 2017; Zare et al. 2017). Additionally, Moore & Teather (2013) observed an increase in student responsibility and independence and more authentic professional application.

The literature reviewed strongly suggests that the affordances of the peer review process correlate to participants seeing how others have created their work and engaging in formative assessment. As a result, there is possible improvement of disposition towards collaborative project work and learners build evaluation and critique skills (Brill, 2016; Cope & Kalantzis, 2013; Ernst et al., 2015; Foote & Martino, 2018). Herrington and Cadman (1991) affirm this claim in their statement that "this process of active, reciprocal decision-making represents the primary value of peer reviews" (p. 184). Eaton and Wade (2014) conclude that in addition to receiving feedback, students will experience "improved ability to critique one's own work and have more familiarity with content and genre" (p.535).

Burke Moneypenny et al. (2018) posit that learning can occur through the peer review process itself and not simply through the incorporation of someone's feedback, such as improved writing skills. Additionally, the majority of studies reviewed relied on longer-term purposes and implications, such as identifying writing strategies (Hojeij & Baroudi, 2018), enhancing additional broad and versatile skills, such as critical thinking or evaluative discernment (Boud & Molloy, 2013; Likkel, 2012; Pozzi et al., 2016; Tornwall, 2018) or creating knowledge (Ernst et al., 2015; Vojak, Kline, Cope, McCarthey, & Kalantzis, 2011). And these purposes can be coupled with the goal of incremental improvement, which can be supported through a scaffolded approach, including multiple peer review cycles of the same or different works (Brill, 2016; Burke Moneypenny et al., 2018; Foote & Martino, 2018).

Moore and Teather (2013) and Brill (2016) both propose that a terminal objective of the peer review process is for learners to be able to transfer not only the learning outcomes and skills to their professional practice, but peer review skills in particular. For example, in nursing education, Tornwall

(2018) reports that a shared governance peer review framework must exist in order to earn magnet (high quality standards) recognition status. However, Boud and Molloy (2013) claim that without an adjustment to the pedagogy and purpose of the curriculum itself, a peer review process can't meet its defined purpose.

Moore and Teather (2013) consider performance improvement as evidence of learning in their purpose of the peer review. Schwegler and Altman (2015), however, warn that the assumption that any feedback will result in performance improvement is a misperception that can lead to unhelpful reviews. Henry & Ledbetter (2011) emphasize that the purpose is to "…approach early reviews more as problem solvers than as error catchers" (p.12).

In addition to benefits for the learners, Hojeij and Baroudi (2018) and Zare et al. (2017) concluded that there is a reduction in instructor workload. Specifically, Zare et al. found that teaching assistant commitment was reduced from six to eight hours a week to one to two hours a week in reviewing weekly lab assignments. However, Ernst et al. (2015) manually assigned anonymous peer reviews, which took a significant amount of time. *Section 2.4.3* addresses instructor involvement in the peer review process.

2.2 Theories Associated with Peer Review in Higher Education

In order for the purposes and benefits to manifest themselves within a peer review process, they should first be grounded in theory. Many theories can and have been aligned with studies associated with the peer review concept in higher education including, but not limited to, Active Learning (Baker, 2016; Poe & Gravett, 2016), Bloom's Taxonomy (Bracke & Graveel, 2014; Johnson, et al., 2010; Kao, 2013; Papadopoulos, Lagkas, & Demetriadis, 2017; Poe & Gravett, 2016), Csikzentmihalyi's System Model of Creativity (Alqahtani & Abunadi, 2016), Community of Inquiry Framework (Zhao, Sullivan, & Mellenius, 2014), Connectivism (Pozzi et al., 2016), Metacognition (Armstrong & Paulson, 2008; Henry & Ledbetter, 2011; Liu & Lin (2007); Pozzi et al. (2016); Sadeghi & Abolfazli Khonbi, 2015; Tornwall, 2018; Tuten & Temesvari, 2013; Wen & Tsai, 2006), New Learning Theory (Cope & Kalantzis, 2013), Bandura's Social Cognitive Theory (Alqahtani & Abunadi, 2016; Cheung, Lee, M., & Lee, Z., 2013; Duers, 2017; Henry & Ledbetter, 2011), and the Template for Assessment of Social Presence (Rourke et al., 1999). Similar to the diversity of disciplines and purposes, the literature reviewed clearly demonstrates that there is diversity in the theories that support peer collaboration and peer review.

The next section will explore two of these theories, which support the specific research question addressed in this literature review.

1. Communities of Practice
2. Sense of Community

2.2.1 Communities of Practice

The concept of a learning community or community of practice is described using various terms in multiple sectors including, but not limited to, professional learning communities, professional interest communities, educational community of inquiry (Garrison & Arbaugh, 2007), communities of practice (Barab & Duffy, 1998), online collaboration groups, online collaborative learning, networked learning communities, or simply learning communities (Stonehouse & Splichal, 2015). Similar to the varying terms and definitions associated with peer review, these terms and definitions are best defined by way of the purpose. Wenger, McDermott, and Snyder (2002) suggest that the structural model of a community of practice includes a domain, community, and a shared practice. The domain could be defined as the purpose and topic of the community of practice, while the term community refers to the members, a feeling of belonging, and how they interact. The shared practice is what is specifically being shared. Jean Lave (1991) claims that learning is "a process of becoming a member of a sustained community of practice. Developing an identity as a member of a community and becoming knowledgably skillful are part of the same process, with the former motivating, shaping, and giving meaning to the latter, which it subsumes" (p. 65). Wenger, McDermott, &Snyder also demonstrate how members can learn as a result of active participation in a community of practice through multi-membership learning cycles.

Stucky and Brown (1996) claim that "we already have a society of learners. We just haven't developed effective ways of leveraging that learning across our organizations to the benefit of all concerned" (p. 22). And these communities may be ad hoc (Lave, 1991) or structured (Gray, 2004). Brown & Duguid (1991) suggest that knowledge is created as a result of small communities of practice, while Cheung et al. (2013) warn that the "sustainability of an online community, particularly an online community of practice, depends largely on whether members are willing to initially and continually share knowledge" (p. 1359). Similarly, Wenger, McDermott, and Snyder (2002) emphasize the importance of being committed to the domain and holding one another accountable, otherwise, it is "just a group of friends" (p. 30). Cope and Kalantzis (2013) refer to a community of knowledge collaborators and claim that the peer review process within such a community will lead to new learning and improved deliverables and outcomes. "Such a learning ecology is one that harnesses learner identities, deepens their sense of engagement, and increases their motivation to devote time to task and engage with others in their knowledge community" (p. 354). These learning communities can also foster a voluntary peer review process, such as in Berry (2017) where a group of students voluntarily created study groups to provide peer reviews. Grady (2016) reports that as relationships are established and students ask one another questions or peer review one another's work, they have knowledge to share. "The network of students reflects a special degree of "know how" in regards to the student's needs as they move through the program. They are available to answer questions from the students' point of view" (p. 50).

2.2.2 Sense of Community

Scholars have attempted to define the "sense of community" concept either in their own words or by sharing student feedback. Shea (2006) conveyed this concept as "sense of shared purpose, trust, connectedness, and learning" (p. 35). McMillan and Chavis (1986) cite McMillan's 1976 definition that sense of community is "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). Barst et al. (2011) suggest sense of community can occur when learners feel accountable to one another, while also reminding readers that a supportive and non-threatening environment must exist. Rovai, as cited in Byrd (2016), stated that when online course design considers the following factors "transactional distance, social presence, social equity, small group activities, group facilitation, teaching style, learning stage, and community size," (p. 105) students feel a strong sense of community.

Trust is generally more inherent between learner and teacher, but can be powerful between peers and the peer review process (Boud & Molloy, 2013). Speaking in the context of an open peer review system in the academic journal process, Nobarany and Booth (2015) discuss the relevance and significance of "politeness" theory in the peer review process and suggest that how one treats another will influence the sense of community. Salajan et al. (2016) observed similar results in their study that when the peer review was in the form of an open (for the students) wiki discussion, it fostered a sense of community. O'Connor and McQuigge (2014) claim that the elements of many online courses, such as wikis, discussions, or live web conferences, may influence the connectedness felt during a peer review process. Kao (2013), however, considers community as a result of students' contributions influencing one another's grades.

Zhao et al. (2014) examined social presence and sense of community within the peer review process and found that complimenting peers' work or expression of appreciation of their feedback led to increased interaction and ultimately an increased sense of community. One group in particular would use one another's names and convey emotion, which "create[d] a warm and collegial group learning community" (p. 816).

2.3 Key Challenges of Peer Review in Higher Education

Several studies reviewed have shown an increase in learning and performance outcomes when students actively participated as both authors and peer reviewers (Moore & Teather, 2013; van Popta, Kral, Camp, Martens, and Simons, 2017). The majority of the literature reviewed demonstrated a goal to identify the conditions that must be present in order for these learning and performance outcomes to

occur. In addition to the varying terminology, definitions, purposes, and theories, this review of the literature encountered some recurring and interrelated challenges, including:

1. Knowledge and experience of and with the peer review process
2. Learner perception and motivation of peer review
3. Peer review quality, which is influenced by items one and two

This section will outline how these issues arose in the literature and why they are of importance in the field of Higher Education. Challenge mitigations will be addressed later in this work.

The literature reviewed suggests that some unfortunate, but prevalent, challenges of the peer review process are that reviewers may not provide the quality feedback needed (Cho & Schunn, 2018; Ernst et al., 2015) and/or are not working as hard as others (Kao, 2013), or authors may not warrant the feedback as credible or sufficient. Brill (2016) found several related challenges to the peer review process from their survey comment analysis including, "unconstructive or superficial feedback; poor communication skills; inadequate attention to the review work; a limited knowledge/skill base; and resistance to the peer review process" (Brill, 2016, p. 693). These concerns can be exacerbated by the presence of additional student workload (Luaces, Díez, & Bahamonde, 2018; Wen & Tsai, 2006). However, Wilson et al. (2015) encourages researchers and instructors to ask the question of whether these challenges are a "transitory phenomenon or deep structural flaws of the peer-to-peer review process in competitive university contexts" (p. 28). Others ask if this is an issue of people or process, or both.

2.3.1 Knowledge and Experience of Peer Review

The majority of the literature reviewed concluded that there is a strong correlation between peer review experience and how that influences perception, motivation, and quality. Additionally, Tornwall (2018) found through an analysis of the extant literature that without adequate preparation, it can lead to a lack of confidence, anxiety, and even a hostile learning environment. Brill (2016) claims that many students are not familiar with the peer review process and need guidance and coaching, Moore and Teather (2013) propose that a solution to this challenge may be a training session, which can provide the medium where instructors can provide feedback on learners' feedback.

Schwegler and Altman (2015) and Philippakos (2017) found that authors must have the ability to discern what is and isn't quality or relevant feedback. They must be critical thinkers themselves. Ernst et al. (2015) found that not all learners had the critical evaluative skills necessary. Additionally, as the author of a work, it is equally important to have a firm understanding of the peer review process and the purpose of the exercise (Eaton & Wade, 2014). Henry and Ledbetter (2011) confirmed that students with limited experience in the peer review process and/or who do not understand their role in the process may

underperform. Wen and Tsai (2006) found that those with less experience may provide reviews that are similar to those that they received and/or reviews in retaliation for reviews that they may have received. However, once they reflect on their review and evaluate modeled behavior, the quality of their reviews improved. As learners play the part of author or reviewer and as a reviewer's experience increases, quality and positive perceptions increase (Brill, 2016; Wen & Tsai, 2006).

2.3.2 Learner Perception and Motivation

Regardless of the design of the peer review process, the perceived benefits will be in the eye of the beholder. The literature reviewed acknowledges that each learner defines success in his or her own way and plays an integral role in achieving that success (Ng, 2016; Zhang et al., 2017). Poe and Gravett (2016) expand on that and claim that accountability must be integrated into the exercise.

Herrington and Cadman (1991) believe that while owning one's own learning, or taking responsibility for one's own learning and not consistently relying on an instructor to tell them what to do, can be seen as a positive outcome, it is also important to consider the anxiety that one may feel when they are not accustomed to this approach. Also reported as significant by Tornwall (2018) is that anxiety may be caused through the giving and/or receiving of peer review feedback. Herrington and Cadman's (1991) findings suggest that many students naturally have a sense of insecurity that their work is not as good as someone else's or that they will receive negative feedback. Conversely, they may feel that others don't know as much as they do and won't be able to provide any meaningful feedback (Armstrong & Paulson, 2008). On the reviewer side, they have concerns about being objective and constructive, rather than biased and negative (Moore & Teather, 2013). Additionally, a negative rating without related or justifiable explanation can lead to negative perceptions and anxiety (Duers, 2017). Snyder (2018) acknowledges how a review is written and delivered can influence how it is received, and thus lead to unnecessary anxiety. To address this concern, Schwegler and Altman (2015) analyzed peer review comments as the basis of their study and provided guidelines on the tone of language used in peer reviews based on the Quality Matters (QM) review rubric, such as "constructive, specific, measurable, sensitive, and balanced" (p. 187).

Common complaints identified by the majority of the research reviewed are that either the feedback is low quality and/or the variance in feedback amongst multiple reviewers is confusing and difficult to discern. Luaces et al. (2018) acknowledge this concern and claim that the value of computer-mediated peer review and assessment technology is that it provides data to authors to facilitate the discernment process. Kim and Ryu (2013) cite the recommendation for authors to engage in a metacognitive exercise to justify the variance in reviewer feedback.

In spite of the favorable learning outcomes from some studies, it is suggested that many learners have the predisposition to feel that the teacher is the authoritative source on the subject and that peer review feedback is less credible (Ernst et al., 2015), or even minimizing their own knowledge, skills, and abilities (Boud & Malloy, 2013). But Boud and Malloy address this concern in positing that this is simply a shift in the teacher's role and value, such as "sustainers of learning" (p. 710). Brill (2016), Kahiigi, Vesisenaho, Hansson, Danielson, and Tusubira (2012), and Yu and Lee (2016) all suggest that cultural background may cause a learner to instinctively minimize peer review feedback and/or prefer instructor feedback. Similarly, Boud and Malloy argue that students consider instructors to have greater status and thus minimize their peers' feedback.

2.3.3 Peer Review Quality

Several case study examples demonstrate varying reasons for poor quality reviews, including learner perception and experience, as outlined previously. But additional factors may contribute to a low-quality review. For example, Noroozi, Kirschner, Biemans, and Mulder (2018) have found that there is a correlation between the quality of an author's writing and the quality of the peer reviews that they produce. As a result of their study, they propose that more emphasis must be placed on elevating the quality of the drafts submitted for peer review.

Lam (2010) raises the concern of "rubber-stamped" reviews that may be easily written to apply to anyone's work. He also suggests the root cause of this behavior could relate to the other challenges (perception and experience), but could also correlate to laziness or other inexplicable factors. Communication challenges may also contribute to the ability to convey the feedback effectively and in a constructive way (Moore & Teather, 2013).

While the literature fails to articulate specific extrinsic rewards besides a grade, Kao (2013) claims that incentivizing learners to provide quality peer reviews is a key element to overcoming some of the challenges of the peer review process, such as incorporating the evaluation of a review as a part of a student's final grade.

2.4 Peer Review Design Elements in Higher Education

As reported previously, the literature reviewed has revealed that peer review approaches vary significantly in terms of their approach and delivery and should be determined based on the purpose of the peer review exercise. This section will convey the literature's findings on several design variances and how they correlate to the purposes, theories, and challenges highlighted in this literature review.

The key peer review design elements that emerged from the literature reviewed can be grouped into the following three categories:

1. Administration, Roles, Logistics, and Rubrics
2. Scaffolding, Training, and Instructor Involvement
3. Self-Reflection and Accountability

2.4.1 Administration, Logistics, and Rubrics

When assigning reviewers, instructors may consider the number of reviews assigned, the role of the author and reviewer, and the identity of the author and reviewer. Cho and Schunn (2018) refer to a maxima strategy in determining the right number of reviewers before they become counterproductive. In studying peer review of both the draft and final version of the work for 250 undergraduate students, the authors emphasized that reinforcement theory (similar feedback from multiple peers), threshold theory (too much feedback), and cognitive overload (similar to threshold, but associated with the ability to process a large volume of feedback) may inversely influence the outcomes. Brill (2016) executed a multi-faced, scaffolded approach that included a combination of multiple rounds of asynchronous feedback periods with a synchronous debriefing session; some graded and some not and found that students demonstrated incremental improvement within a given class.

Role of the Author and Reviewer

The literature reviewed did not demonstrate a consistent application of assigning reviewers and most did not consider this design variable as a treatment variable in their study, such as how many reviewers were assigned. However, the majority of studies reviewed concluded that when authors also play the role of reviewer, they are more aware of and more engaged in the process, play an active role, provide more substantial feedback, and increase their metacognitive skills, all of which contribute to both motivation and quality (Henry & Ledbetter, 2011; Hojeij & Baroudi, 2018; Herrington & Cadman, 1991). As learners come to recognize the opportunities afforded by the peer review process, such as improving their own work (Brill, 2016), their perceptions of future peer review exercises have the potential to increase (Hojeij & Baroudi, 2018; Mulder, Pearce, & Baik, 2014; Mulligan et al., 2013).

One of Nicol and Milligan's (2006) seven principles of good feedback is "good feedback practice 'encourages teacher and peer dialogue around learning'" (p. 6). They claim that simply "telling ignores the active role of the learner" (p. 6). Aghaee and Hansson (2013) found in their study that 40% of students took advantage of the optional peer review opportunity because of the ability to engage in asynchronous dialogue prior to submitting their final work. Price, Handley, Millar, and O'Donovan (2010) concluded that feedback of any kind without dialogue leads to confusion and disengagement, which Davies (2009) echoes when examining the benefits of commenting on a peer's work rather than simply rating it.

van Popta et al. (2017) developed a process model that demonstrates how providing peer feedback is a learning activity and addresses the benefits to those providing reviews. The model depicts the cyclical relationship between cognitive processes and the benefits to the provider while engaging in a multi-role peer review process. Ernst et al. (2015) found that the act of writing the review in some cases was more valuable than the feedback received. As one participant stated, "writing the review was more beneficial. You had to really look at a proof and figure out why something was right or wrong, and give an explanation. Not just 'this doesn't look right.'" (p. 127). However, a limitation to consider, which was acknowledged by Ernst, was that the author may have received less than helpful feedback themselves, thus rating their review experience higher than their feedback experience. Lam (2010) suggests that holding authors accountable for the quality of their drafts prior to the peer review process can increase efficiency and effectiveness.

Cheung et al. (2013) theorized for their study "that members make judgments about their knowledge-sharing behaviors by comparing their normative expectations of reciprocity and their ability to help other members, with their actual experiences. These judgements affect members' satisfaction and knowledge self-efficacy, and thus influences their intentions to continue sharing knowledge in online communities of practice" (p. 1358). Wilson et al. (2015) found that learner perception was negative when the reviewer's role focused on summative assessment (grading), especially if instructors consider peers' assessments in the final grade. Some researchers theorize that instructors can and should consider the peer review ratings while O'Connor and McQuigge (2014) claim that instructors should not be influenced by peer ratings, and Bose and Rengel (2009) suggest that peer assessment should focus on lower-level assessment rather than grades.

Identity of the Authors and Reviewers

The literature reviewed indicated mixed results whether the identity of the authors and reviewers should be made known. For example, Ernst et al. (2015) propose that anonymity generally implies fairness and they report on respondents across multiple studies that they were more comfortable in sharing constructive feedback when they were anonymous, while Selfe and Hawisher (2012) argue that openness can result in richer dialogue. Tornwall (2018) provided a comparative analysis on the outcomes of open and anonymous peer review feedback and referenced previous notions that anonymity is required in order to be objective. However, she found in her own study that in the nurse education context, anonymity did not reduce objectivity and also did not support the long-term goal of the peer review process that would translate into the workplace for their target audience. She concluded that more research needs to be done in this area and claims that anonymity prevents the ability to engage in a dialogue. Similarly, Zhao et al. (2014) claim that openness of author and reviewer names is necessary so

that participants know who to contact. Although in Vojak et al. (2011) one can quickly observe that through the use of a technology platform, such as CGScholar, that dialogue can in fact occur, even if anonymous. But notwithstanding, dialogue will not automatically occur without appropriate modeling and scaffolding (Brill, 2016; Henry & Ledbetter, 2011; Verleger, Rodgers, and Diefes-Dux, 2016). Additional conflicting findings are uncovered when Zare et al. (2017) states authoritatively that they chose an anonymous peer review approach because it is more fair, while Guardado and Shi (2007) claim that anonymity can discourage online peer negotiation of feedback because authors did not know who they should ask for clarifications of received feedback (as cited in Zhao et al., 2014).

2.4.2 Delivery and Timing

Delivery

The peer review process can be administered synchronously or asynchronously and electronically, verbally, hand-written, or a combination (Brill, 2016; Henry & Ledbetter, 2011; Lam, 2010; Zare et al., 2017), while several studies addressed a combined method of in-person and out-of-class, independent peer review exercises (Baker, 2016; Brill, 2016, Hojeij & Baroudi, 2018). Ernst et al. (2015), Likkel (2012), and Vojak, et al. (2011) all propose that a peer review process may be administered electronically. The majority of studies reviewed did not specifically examine the benefits of these approaches, but rather explored the benefits of peer review as a learning and assessment practice. However, Guardado and Shi (2007) claim that electronic delivery is more effective due to its flexibility and enablement to provide more critical comments.

It was found that there is variety in electronic applications, including purely mobile solutions (Hojeij & Baroudi, 2018). A few examples of tools discussed in the research reviewed include Notably (Hojeij & Baroudi, 2018), CGScholar (Cope & Kalantzis, 2016), Computerized Assessment by Peers (CAP) (Davies, 2009), Peer Mark (Ernst et al., 2015), SAKAI Collaborative and Learning Environment (Zhao et al., 2014), SWoRD (scaffold, writing, and rewriting) (Burke Moneypenny et al., 2018; Cho & Schunn, 2018), Moodle's Workshop tool (Wilson et al., 2015), and Calibrated Peer Review (Likkel, 2012; Vojak et al., 2011). These studies that incorporated a technical element including Lam (2010), revealed that the inclusion of technology has enabled this process to be more efficient and accessible, but the authors warn that this does not necessarily guarantee improved results.

The use of technology, it was found, assists in obtaining a variety of metrics, whether for insight or assessment purposes. Wilson et al. (2015) found that the automated metrics negatively influenced the perceptions of their study participants, especially when the peer review process served more as a summative peer "assessment", but also cautioned that these results may be due to a poorly-executed

process. Davies (2009) was able to apply a variety of metrics through the use of the Computerized by Assessment (CAP) system. The final grade applied the following ratios: essay (60), mark consistency (15), comment consistency (15) and showing consistency in producing marks and comments (10). The results of this study demonstrated "a high positive correlation of 0.85 (significant positive correlation between the overall assessment outcome and the actual essay grade)" (p. 330), but also acknowledged that further research needs to be done in order to generalize these results. In a study grounded in self-regulated learning theory by Zhang et al. (2017), the instructor used the peer assessments on the relevant rubric areas to calculate students' grades on the document (40% of the assignment grade), and additional grade for peer review accuracy (20%), peer review helpfulness (20%), and task completion (10%). Each writing assignment produced 20% of students' course grade" (p. 685).

Frequency and Timing

Baker (2016) examined the influence of scheduling the peer review exercise early in the semester (four weeks prior to the final paper deadline) and conducted the reviews during class using a rapid review process and found that about 80% of students submitted a complete draft by the draft deadline, which led to positive learner perception of the peer review process.

Davies (2009) examined a multi-review process where reviewers had an opportunity to review the same work a second time after receiving their own work's review results and reviewing the comments of their peers on the works they reviewed. He found that while it increased student perception, it may not have had a specific impact on revised ratings or comments. While in the review of academic journals, multiple rounds of peer review may feel excessive (Kumar, 2014), but in the case of higher education courses, Liu and Lin (2007) claim that multiple rounds throughout the course enable manageable effort and encourage incremental progress.

Rubrics

The literature reviewed demonstrates positive outcomes of leveraging a rubric with a peer review process. A rubric may be a rating scale or yes/no (Mulder et al., 2014) and may include requests for narrative responses which enhances the reviewers' skills (Barst et al., 2011). This also supports the theory of metacognition. Liu and Lin (2007) analyzed peer feedback according to four metacognitive strategy categories: description, simple judgement, elaborated judgement and suggestion. The first two being beginner-level with the latter two being advanced-level. Barst et al. (2011) also encourage rubrics to address both positive and constructive feedback and suggest that "the instructor's prompts give [students] greater insight into the most important expectations of each assignment" (p. 129). They ultimately

concluded that if the rubric directs them to focus on evaluative comments, they deploy advanced levels of metacognition.

Schwegler and Altman (2015) found that using the review rubric on one's own work increased the familiarity with the peer review process and the rubric, and also encouraged higher level evaluative thinking. Eaton and Wade (2014) examined using the same rubric across sequential Calculus courses, but elevated the expectations from one course to the next. They found that in their open, in-person, paired peer review process that students improved their knowledge of the course material and also received "early intervention" feedback to improve their work prior to final submission and increased self-regulated learning.

It was found in the literature reviewed that written guidelines, such as a rubric, can assist reviewers in reducing anxiety, providing higher quality reviews, and increasing their perception of the peer review process (Moore & Teather, 2013; Pearce et al., 2009), while Duers (2017) found that including students in establishing the rubric criteria influenced those outcomes.

Romulo, Raoufi, Largen, and Schwebach (2018) claim that a very specific rubric is necessary to minimize the gap between peer and instructor feedback, while Luaces et al. (2018) supplement this by positing that a rubric leads to more consistency. However, they acknowledged that most reviews include a level of subjectivity. Foote and Martino (2018) found in their study regarding physics lab reports that their detailed rubric resulted in "actionable feedback, while minimizing the amount of writing required of the grader" (p. 467).

2.4.3 Scaffolding, Training, and Instructor Involvement

Scaffolding and Training

In an effort to mitigate the challenge of limited peer review knowledge and experience, studies reviewed suggest incorporating scaffolding, coaching, or training into the overall curriculum and peer review design. Several studies have observed an improvement in peer review quality through a scaffolded approach, including an introductory training session (Brill, 2016; Henry & Ledbetter, 2011; Hojeij & Baroudi, 2018; Moore & Teather, 2013). Moore and Teather demonstrated the value of providing some level of training, coaching, and support prior to the first official peer review exercise. By providing sample assignments to be reviewed, and then discussing the process and feedback itself, learners felt more prepared to engage in a real-life peer review experience. Having an opportunity to see good and not-so-good examples can provide reviewers with some context and something to compare their own work to (Brill). Davies (2009) suggests learners to self-assess their draft as a way to become familiar with the

process and to establish a standard for themselves. Lam (2010) outlines three stages for a peer review training workshop, as outlined in Figure 2.1.

Stage 1: Modeling
- Purpose of peer review
- Rationale of training workshop
- Introduction of four-step procedure
- Introduction of error correction
- Demonstration of how to attend to both content and language errors with reference to the scoring rubrics

Stage 2: Exploring
- Practice of peer review procedures
- Practice of four-step procedure
- Discussion of quality of rehearsed peer marking
- Presentation of peer review process
- Clearing up students' misunderstandings and resolving uncertainties

Stage 3: Consciousness-raising
- Preparing a mini-essay for practice
- Teaching students how to analyze peer feedback based upon area, nature and type (Appendix C)
- Teaching students how to analyze the effectiveness of peer feedback in terms of incorporation rate and reasons why some feedback is not adopted
- Keeping a peer review log for consciousness-raising purposes

Figure 2.1 Online peer review training model (Lam, 2010)

Moore and Teather (2013) suggest that a training session can provide the medium where instructors can provide feedback on learners' feedback. Lam (2010) also found that the training experience resulted in higher quality peer reviews, but also a greater level of awareness of the quality of one's own work. However, Lam also acknowledged the reality that success in this area is still dependent on the learner's perception of the peer review feedback, their ability to incorporate the feedback, and their prior knowledge of the peer review process.

Brill (2016) also provided a visual overview of the scaffolding process examined in her study, as outlined in Figure 2.2.
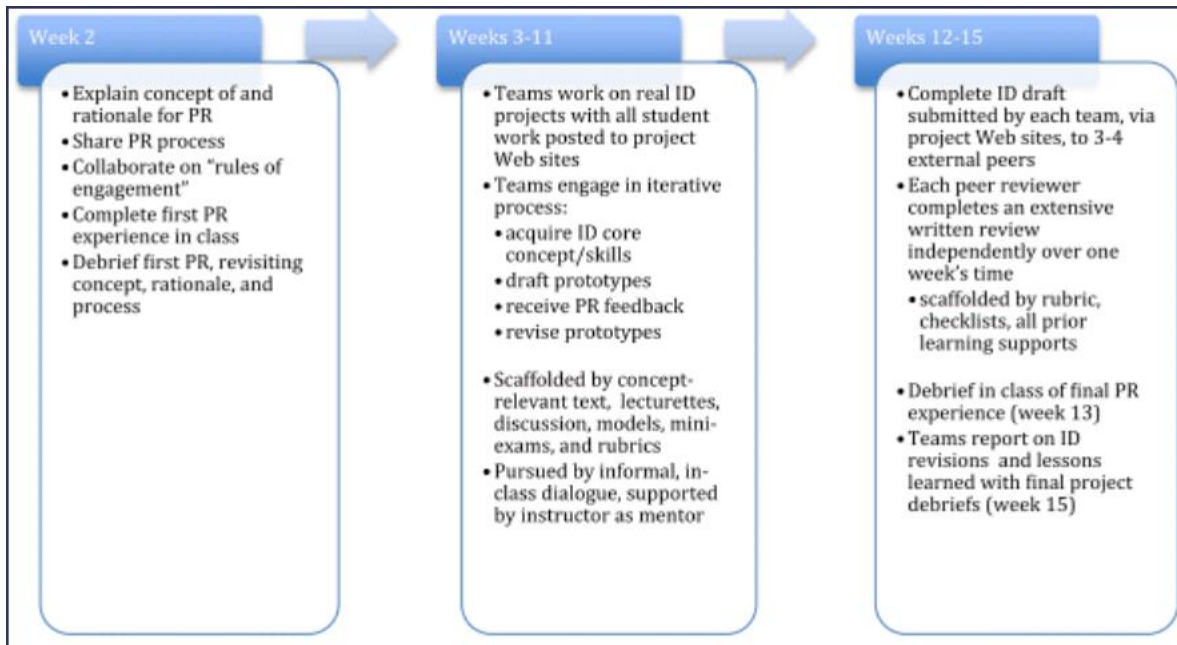
Figure 2.2 *Overview of peer review progression in 15-week Instructional Design course; Figure 4 (Brill, 2016)*

Similar to Brill's scaffolded approach, Kim (2015) suggests that training should occur before, during, and after the peer reviews are complete. A shared understanding of the rubric and peer review best practices can increase the confidence and quality, while coaching students on how to evaluate and incorporate feedback is equally important. Lam (2010) concluded that while effective training contributed to the effectiveness of the process, the students' perception of the value of the feedback will have the most impact.

Instructor Involvement

Another recurring theme in the literature reviewed was the role of instructors in the feedback and assessment process. Kahiigi et al. (2012) align the peer review process with Vygotsky's Zone of Proximal Development and found that when students are involved in the feedback channel, learners are moved to the center of the learning experience. Moore and Teather (2013) observed in their study a conversion from passive to active learner and claim that relying on peers compared to an instructor raises the awareness of the situation where the learner feels a great sense of responsibility and authority to not only provide feedback to peers, but to own their learning, which can influence self-regulated learning. The theory of Self-regulated Learning is defined by Broadbent and Poon (2015) as having the "self-generated ability to control, manage, and plan their learning actions" (p. 2). Moore and Teather concluded from their study that the peer review process helped to maintain the detailed feedback necessary for the situation while easing the burden on the instructor. Anson and Anson (2017) analyzed over 50,000

feedback responses of both instructors and peers and found similarities between instructor and peer usage of certain terms.

A number of studies reviewed claimed that trust is generally more inherent between learner and teacher, but can be equally powerful - and even required - between peers within the peer review process (Boud & Molloy, 2013; Johnson et al., 2010). The review of the literature by Brill (2016) found that many studies supported peer review feedback being just as valuable as that of an instructor. She also reported that students received more detailed feedback from their peers than they may have received from the teaching assistant. And ultimately, this study found an increase in final exam performance for students who had participated in the peer review process. Similarly, in Kahiigi et al. (2012), students shared that they were able to improve their own work as a result of the reviews they were conducting – this was prior to receiving their own feedback from their peers. Participants also responded favorably that they received feedback more quickly from peers than they did from the instructors. However, these same participants conveyed that they preferred feedback from the instructors.

The majority of the literature reviewed states one of the benefits of peer review is to reduce instructor workload (Aghaee & Hansson, 2013; Davies, 2009; Wilson et al., 2015). Nicol & Milligan (2006) report the use of peer review software can also reduce instructor workload. However, as the burden is reduced for instructors, Luaces et al. (2018) claim that some may feel that the burden increases for the learners. Baker (2016) suggests to mitigate this challenge, instructors must treat peer review as an integral part of the curriculum by allocating the appropriate amount of time. Boud and Malloy (2013) also found that feedback needs to be "repositioned as a fundamental part of curriculum design, not an episodic mechanism delivered by teachers to learners" (p. 699). Similarly, Wilson et al. (2015) posit that instructor workload isn't necessarily reduced, but is shifted to preparing students to serve as effective peer reviewers or assessors. Little (2009) claims that the inclusion of self-reflection leads to greater autonomy which leads to a shift in the teacher's role. Ultimately, Wilson et al. (2015) warn that the primary purpose of peer review and assessment should be student learning and not a reduction in workload for instructors.

2.4.4 Self-Reflection and Accountability

Self-review and self-reflection in this section refer to multiple facets and also align with the importance of accountability of both author and reviewer. These facets include:

- Reflection and review of one's own work
- Review and reflection of other's work being reviewed
- Reflection of the reviews received and how one might implement feedback or other learnings

Self-Reflection

Tornwall (2018) refers to self-reflection as advanced self-assessment, while Lam (2010) considers this a part of the "consciousness-raising stage" (p. 119) of the peer review process. The literature reviewed acknowledges that it may be assumed and common for learners to rate themselves high, however, Ng (2016) found that students are sometimes harder on themselves than they should be. The majority of the literature reviewed also claim that when the intent of the self-review is not in the grade, but rather true self-reflection, there is the potential for more accurate ratings and improved revisions.

Tuten and Temesvari (2013) conclude there is improvement in evaluating one's own work prior to submitting a final version after reviewing peers' work. Reflection and motivation come from the author evaluating both the reviews given and received. Henry and Ledbetter (2011) emphasize that when "effectively mined, peer review can help student learners discern their own shortcomings and ways to surmount them without instructors' instructions…" (p.11).

Philippakos (2017) posits that not all students know how to evaluate their own writing. A peer review design specifically focused on self-reflection by Zhang et al. (2017) found that there is an increase in improvement and an increase in revision quantity when self-reflection is incorporated into the overall process. In support of that, Likkel (2012) suggests that authors improve their writing when they evaluate their work against the rubric. Sadeghi and Abolfazli Khonbi (2015) found that students who engaged in the self-assessment treatment group performed significantly better than those from the control group who did not engage in self-assessment.

Lam (2010) found that coaching authors on how to evaluate the feedback they received is equally important as providing feedback themselves, specifically maintaining a peer review log that indicates how feedback was addressed. Dialogue is another medium to reflecting on the feedback received and may lead to additional reflection.

Self-reflection prior to creating a work, such as writing learning goals in advance of the assignment, may also influence learning and the peer review and revision process (Zhang et al., 2017; Bose & Rengel 2009). Zhang et al. explored the implications of multiple sources that may lead to revisions and found that overall, 65% of revisions were attributed to at least one of three sources – peer review, self-review, and lessons learned. They also found that 80% of the peer comments were related to "high-level revisions".

Accountability

The literature reviewed addressed the issue of both the author and reviewer being held to a level of accountability in the peer review process. Several differing views emerged on whether the peer reviews themselves should be assessed. Moore and Teather (2013) concluded that less learning occurred when the peer review process was focused on a grade rather than the idea of improvement. However, Barst et al. (2011) and Zhang et al. (2017) suggest that the instructor evaluating the reviewers on the use of the rubric influences the quality of reviews. Wen and Tsai (2006) and Baker (2016) both addressed the benefits of the reviewers when considering the decision to assess the reviews. They found that by focusing on high quality, meaningful feedback, the reviewers were able to not only assist their peers, but also improve their own writing. Specifically, Baker found that 85% of students provided meaningful feedback when they were evaluated on their reviews.

Hojeij and Baroudi (2018) claim if the review is equally important as the work being reviewed, this can enhance the attention to detail given, while Boud and Molloy (2013) suggest that the author holds a level of responsibility in the quality of the peer review by "eliciting the kind of feedback they need" (p. 711). Burke Moneypenny et al. (2018) conveyed the results of their study that authors reported the reviews they received were actionable (37.3%), user- friendly (37.3%), and consistent (36.4%). Similarly, participants reported giving peer reviews that are user-friendly (76.1%), consistent (50.9%), and goal-referenced (49.1%) (p. 242). Davies (2009) examined holding students accountable for consistency and fairness; no bias for the work being reviewed and having comments to support the ratings.

Kao (2013) established a grading metric that encompasses both the ratings received by reviewers, but also a student's rating of their review, which enabled students to be rewarded for both quality work and quality reviews. And both elements can be assigned their own weight depending on the goal and objective of the exercise. Similarly, in Zhang et al. (2017) they calculated students' grades in the following way: the assignment (40%), peer review accuracy (20%), peer review helpfulness (20%), and task completion (10%).

When considering the outcomes of Wen and Tsai (2006), incorporating an assessment of the review in the process has the potential to increase the motivation and quality of the peer review, especially if reviewers are being graded on this review. In spite of highly-rated survey responses across multiple studies reviewed, it was uncommon for these studies to correlate the author-to-reviewer responses. For example, in Moore and Teather (2013) they cited that 91% of survey respondents reported that they felt that they provided valuable feedback, but they did not report whether the authors responded favorably to the question related to the feedback that they received. Similarly, Wilson et al. (2015) concluded that when the weight of the peer review process increases, engagement and outcomes increase.

In contrast, Barst et al. (2011) address the concern of retaliation where students worry that low ratings on a peer review may result in low ratings on the review evaluation.

2.5 Gaps in the Literature and Implications

A high volume of literature and published research to-date reviewed, focuses on case study examples of peer review exercises, including the focus of their study, the design used, and the outcomes of the study. This conveyed a wide picture of the diversity and complexity of the field of peer review as well as the broad opportunities, affordances, and implications. The literature in this review demonstrates the flexibility of settings where a peer review process can be deployed and that value is not simply limited to writing-focused exercises. It also demonstrated the diversity of design choices and the implications of those designs. Several areas of opportunity exist, such as considering the work type, length of the work, and the frequency of completing peer reviews. Additionally, the theory of Sense of Community and Communities of Practice or peer-to-peer learning could serve as the foundation of more studies. Two other opportunities for additional research include the specific discipline of the doctoral dissertation process and also longitudinal studies.

Work Type, Length, and Frequency

Although most studies addressed in this literature review mentioned the type of work being reviewed, very few studies addressed the implications of the variance in the work type, quantity of reviews, or length or complexity of the work being reviewed. These factors may influence learner perception and motivation and the outcome of the review itself. Additionally, the literature reviewed didn't present many studies that involved multiple rounds of reviewing the same work. It's possible that the implications of this design variable could be influenced positively or negatively depending on the other variables.

Online Community of Practice and Sense of Community

As demonstrated in this literature review, while the majority of studies reviewed found their peer review exercises to be meaningful and some cited the design elements that may have contributed to those outcomes, very few studies examined or concluded the role that a community of practice or the sense of community (whether in an in-person or online course) may play in the perception, motivation, and peer review quality. Additionally, studies reviewed that were associated with community of practice failed to align their theories with the peer review process. However, there are clear alignment opportunities when you review the challenges, benefits, and even the design elements of the studies reviewed.

Doctoral Dissertation Peer Review Process

As mentioned in this literature review, only a small number of studies reviewed address peer review during the doctoral dissertation process. While Aghaee and Hansson (2013) examined the voluntary use of a "peer portal" for undergraduate and Master's thesis writing, most of the peer review-related research reviewed is focused on course-specific case studies.

Longitudinal Studies

Brill (2016) demonstrated incremental improvement within a course through the use of multiple peer review experiences. However, the largest gap in the literature reviewed was longitudinal studies of the same user population that represent on-going improvement beyond the course highlighted in the study. Almost all studies included in this literature review focused on a single course or multiple instances of one or more courses, rather than following a student through their educational, personal, and professional journeys.

2.6 Summary and Research Questions

The varying definitions and purposes along with the diversity of peer-to-peer learning and peer review design elements addressed in the literature reviewed demonstrate the flexibility and power of the peer review process. Tornwall (2018) found in her literature analysis that the challenge in generalizing the results across research studies of the peer review process stems from the diversity of disciplines, pedagogies, and the variety of peer review designs. While the purposes, design, and benefits will vary across scenarios and circumstances, the literature reviewed generally reports favorable results.

The literature reviewed testifies that the peer review process can be a powerful and empowering learning and assessment strategy that elevates a learner's aptitude and capacity. It is clear, however, that certain conditions are required, such as scaffolding (Brill, 2016) and trust (Alqahtani & Abunadi, 2016). In most every study reviewed, issues were noted and the literature revealed the complexity and challenges associated with implementing a peer review process. Some researchers cited in this review provide suggestions on how to formulate a peer review process that mitigates those challenges, such as including rubrics and coaching (Eaton & Wade, 2014; Lam, 2010; Pearce et al., 2009; Zare et al., 2017). This literature review also heightens the importance of a holistic curriculum, including peer collaboration, and not simply a peer review event as a part of the curriculum.

Similar to any other instructional strategy, most of the sources reviewed warn that a one-size-fits-all solution does not serve the peer review process well. The majority of studies reviewed do not point to a single model that could be considered a best practice intended to be relevant to all situations. However,

there is an underlying theme that a sense of community may be a contributing factor to the positive perception, motivation, and peer review quality.

Further research to examine the relevance and implications of feeling a sense of community and its relationship to peer review is necessary, especially coupled with other proven design elements or factors, such as peer review experience, authors as reviewers, and self-reflection. Additionally, while research has been conducted on the benefits and outcomes of peer review, there is limited research of online peer reviews specifically in the doctoral dissertation process. Therefore, research focused on this context should be conducted. To address these gaps, the present study will be conducted with students from the Learning Design and Leadership Doctor of Education program at the University of Illinois at Urbana-Champaign. These students engage in a peer-to-peer learning model throughout their regular coursework and dissertation milestones.

This study aims to answer the following research questions and investigate the following hypotheses:

Research Question 1: What is the relationship between sense of community and peer review for doctoral dissertation students?

> **Hypothesis 1:** Sense of community increases as doctoral dissertation students complete more peer reviews.

> **Hypothesis 2:** Peer review contributions, such as annotations and number of words, are indicators of a relationship with participants' Sense of Community score.

Research Question 2: What factors emerge as the constitutive elements of sense of community?

> **Hypothesis 3:** Both programmatic and peer review factors contribute to the level of sense of community

CHAPTER 3: THEORY AND METHODOLOGY

3.1 Theory: Sense of Community and New Learning

This chapter outlines key concepts related to sense of community and New Learning (Cope & Kalantzis, 2012) and how these theories are associated with peer review. Many theories can be associated with peer review, such as metacognition, self-regulated learning, and communities of practice. However, the theories of sense of community and new learning were selected because of their close alignment to the context of the present study. This chapter will also address the limitations of these theories.

3.1.1 Sense of Community

As stated in *Section 2.2.2*, the term *sense of community* was first officially defined by David McMillan in 1976 in an unpublished manuscript with the context of physical neighborhoods and communities. Cited in McMillian and Chavis (1986), McMillan defines sense of community as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p.9). Figure 3.1 provides an overview of their theory.

I. Membership

Common Symbol System

Boundaries

Sense of Belonging and Identification

Emotional Safety — Personal Investment

II. Influence

 A. Member openness to influence by community members ←→ power of member to influence the community.

 B. Member need for consensual validation × community's need for conformity = community's power to influence members (community norms).

III. Integration and Fulfillment of Needs

 A. To the degree that communities successfully facilitate person–environment fit (meeting of needs) among members, members will be able to develop sense of community.

IV. Shared Emotional Connection

 A. Formula 1: Shared emotional connection = contact + high-quality interaction.

 B. Formula 2: High-quality interaction = (events with successful closure − ambiguity) × (event valence × sharedness of the event) + amount of honor given to members − amount of humiliation.
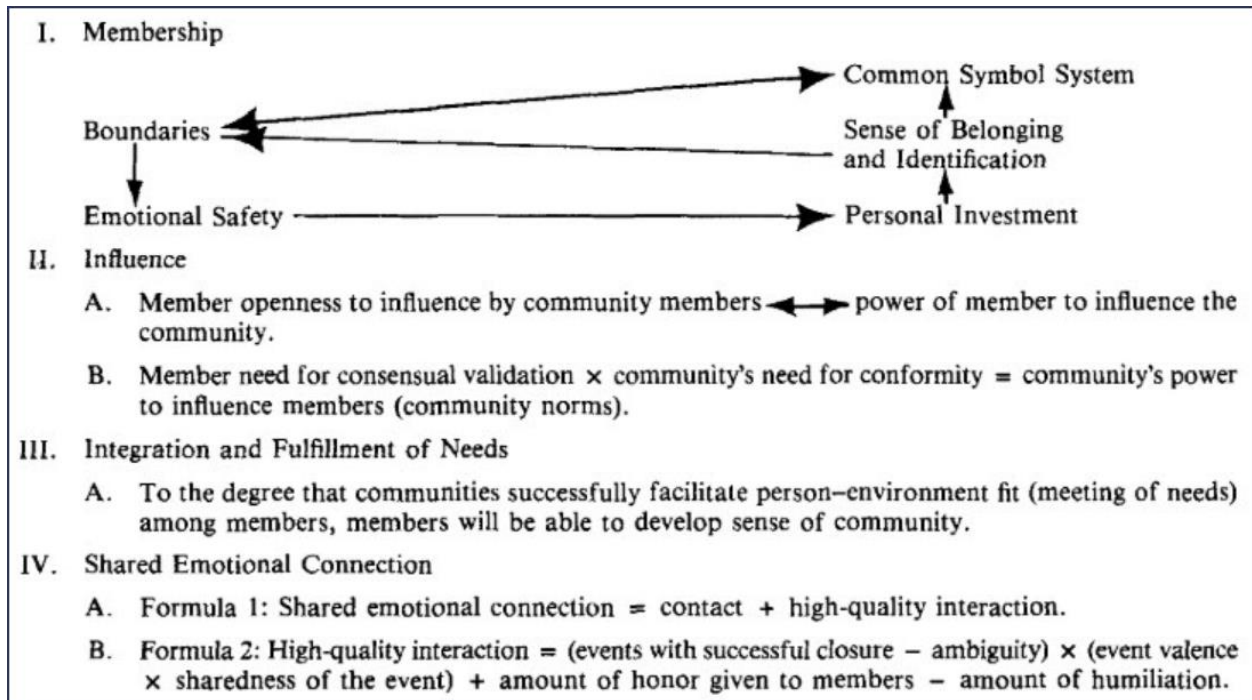
Figure 3. 1 *Elements of Sense of Community and their Hypothesized Relationships; Table 1 (McMillan & Chavis, 1986)*

Since that time other researchers, including Alfred Rovai, have relied on this definition, but have expanded the usage to traditional and online learning environments. However, Jordan Halter, Kleiner, and Formanek Hess (2005) raise the concern that the majority of the literature on sense of community is focused on the early years of a learner's journey rather than the thesis and dissertation phase. In Berry (2017) "students defined their community as a highly interactive and supportive social group where peers collaborated and pursued degree-related goals" (p. 39). This definition addresses both the social and cognitive presence, but neglects the teacher presence, which are the three elements of the Community of Inquiry Framework developed by Garrison and Arbaugh (2007). Shea (2016) conveys sense of community as "sense of shared purpose, trust, connectedness, and learning" (p. 35).

Each student may define their sense of community differently. Weideman et al. (2001) refer to four stages of socialization including anticipatory (leading up to the start of the program, gathering information, etc.), formal (establish roles and responsibilities), informal (take action on roles and responsibilities), and personal (more self-directed and integrated into the community). Each of these demonstrates a scaffolding approach, but also demonstrates that socialization can occur at each of these stages, but at varying degrees.

The sense of community should not be consolidated into a single group, such as their cohort or a specific class. As cited in Berry (2017), White and Nonnamaker "argue that, for doctoral students, academic community can be understood as occurring in five overlapping spheres – the discipline or professional field, the institution, the department, the lab, and the advisor-student relationship" (p. 37). It is possible for a student to feel connected and feel that sense of community within one sphere, but not another. Or the act of building that sense of community in one sphere may expedite feeling a sense of community in another sphere. "While many other spheres impact doctoral students' experiences, their sense of community is based significantly on where they are in relationship to any of the aforementioned groups" (p. 37). Shea (2016) suggests that online learning communities can be designed to represent good and supportive examples of constructivist settings that are situated in each student's context, increasing the ability to feel a sense of community.

The concept of establishing a sense of community relies on several overlapping theories including Maslow's Hierarchy of Needs, Vygotsky's Zone of Proximal Development, and Cope and Kalantzis' New Learning. The learner, the learner's peers, and the learner's advisors and mentors all contribute to developing a sense of community. Briefly addressing these three theories, learners benefit from a scaffolding approach that is built on prior knowledge, experiences, and needs in order to progress and engage in the co-creation of knowledge – and ultimately advance to a higher level of needs and establishing that sense of community. And each learner contributes their individual perspective,

experiences, culture, goals, and more to influence that same co-creation of knowledge and sense of community for themselves and others.

Rovai's Sense of Community Scale

Rovai (2002) developed and field-tested a sense of community model, known as the Classroom Community Scale with the aim of examining what influences students' community experiences. The study used to validate the instrument included 375 students across 28 online graduate courses. Additionally, "two internal consistency estimates of reliability were calculated for the Classroom Community Scale: Cronbach's coefficient and the split-half coefficient corrected by the Spearman–Brown prophecy formula" (p. 206).

This model includes 20 questions on a 5-point Likert-type scale, with no answer being right or wrong. Questions addressed both learning and connectedness and not all were written to be positive feelings. The questions are listed in Figure 3.2.

	Strongly agree (SA)	Agree (A)	Neutral (N)	Disagree (D)	Strongly disagree (SD)
1. I feel that students in this course care about each other	(SA)	(A)	(N)	(D)	(SD)
2. I feel that I am encouraged to ask questions	(SA)	(A)	(N)	(D)	(SD)
3. I feel connected to others in this course	(SA)	(A)	(N)	(D)	(SD)
4. I feel that it is hard to get help when I have a question	(SA)	(A)	(N)	(D)	(SD)
5. I do not feel a spirit of community	(SA)	(A)	(N)	(D)	(SD)
6. I feel that I receive timely feedback	(SA)	(A)	(N)	(D)	(SD)
7. I feel that this course is like a family	(SA)	(A)	(N)	(D)	(SD)
8. I feel uneasy exposing gaps in my understanding	(SA)	(A)	(N)	(D)	(SD)
9. I feel isolated in this course	(SA)	(A)	(N)	(D)	(SD)
10. I feel reluctant to speak openly	(SA)	(A)	(N)	(D)	(SD)
11. I trust others in this course	(SA)	(A)	(N)	(D)	(SD)
12. I feel that this course results in only modest learning	(SA)	(A)	(N)	(D)	(SD)
13. I feel that I can rely on others in this course	(SA)	(A)	(N)	(D)	(SD)
14. I feel that other students do not help me learn	(SA)	(A)	(N)	(D)	(SD)
15. I feel that members of this course depend on me	(SA)	(A)	(N)	(D)	(SD)
16. I feel that I am given ample opportunities to learn	(SA)	(A)	(N)	(D)	(SD)
17. I feel uncertain about others in this course	(SA)	(A)	(N)	(D)	(SD)
18. I feel that my educational needs are not being met	(SA)	(A)	(N)	(D)	(SD)
19. I feel confident that others will support me	(SA)	(A)	(N)	(D)	(SD)
20. I feel that this course does not promote a desire to learn	(SA)	(A)	(N)	(D)	(SD)

Figure 3.2 Classroom Community Scale Questionnaire (Rovai, 2002)

This model was chosen as a foundation for this study because of its reputation across the literature reviewed and the adaptability of the survey questions. Additionally, the data from the present study can be applied in a meta-analysis of the Classroom Community Scale. However, it was important to recognize any extraneous variables that may have influenced the outcome of the present study compared to other studies.

In order to align with the purpose of the study, the Classroom Community Scale questions were adjusted slightly regarding the term "course", as this study focuses on a broader process and set of experiences. *Refer to Appendix A for the specific questions included in the present study*.

3.1.2 New Learning

The specific program under investigation in the present study is informed by *Seven Affordances of New Learning* developed by Kalantzis and Cope (2012), as illustrated in Figure 3.3. These affordances are integrated into the peer-to-peer learning pedagogy and enablement of a peer review process and may be contributing factors when addressing the research questions and hypotheses of the present study.

Figure 3.3 Seven Affordances of New Learning (Cope & Kalantzis, 2012)

3.1.3 Limitations

Sense of community as a theoretical construct has its limitations. Initially, it is relative and subjective. It is also very dependent on the learner him/herself. Regardless of the effort to enable one to feel a sense of community, it is ultimately the responsibility of the learner to take action and also choose to feel a sense of community. However, it is equally important for those fostering community to consider these variables in designing and facilitating the community and peer review process. To address this group of limitations, this study provides opportunities for participants to propose their own definition of and rating of sense of community.

Another limitation relates to potential barriers to feeling a sense of community, such as cultural or other aspects of diversity. Additionally, in certain contexts there could be barriers such as availability of time, personality traits, language differences, and time zone variance. In order to address these limitations, the program examined in the present study has enabled asynchronous learning opportunities and asynchronous, online peer review exercises.

3.1.4 Theoretical Concept Summary

Sense of Community, and particularly Rovai's Sense of Community Scale and Cope and Kalantzis' New Learning Theory serve as the foundation for this study as they support a collaborative, peer-to-peer learning paradigm. The research design of the present study considered both the strengths and limitations of these theories in order to minimize the impact of those limitations and to enhance learner outcomes.

3.2 Methodology Plan

This chapter first provides an overview of the present study and outlines the implemented methodology, its design, data collection, and implementation timeline. It also briefly addresses the context of the present study, including the participants and the role of the researcher. This chapter presents the methodology for the present study in seven sections:

1. Study Overview
2. Researcher's Role
3. Mixed Methods, Exploratory Case Study Approach
4. Implementation Plan
5. Data Sources and Data Collection Procedures
6. Data Analysis Procedures
7. IRB

Refer to the Appendix for data collection instruments and other related information.

3.2.1 Study Overview

The present study formally began in January 2020 for a period of twelve months and included participants from a specific online Doctor of Education program; Learning Design and Leadership at the University of Illinois at Urbana-Champaign, a large research-based university in the midwestern United States. Historical data between September 2018 and January 2021 were used as a part of the present study.

To address the purpose of the present study, this study deployed a mixed-methods, exploratory case study design using surveys, focus group interviews, data from CGScholar, the platform used for dissertation-related work submissions and peer reviews, and researcher observations and reflection. The present study examined the intersection of sense of community. The present study aimed to serve as an exemplary, yet adaptable framework for peer-to-peer learning paradigms for other on-campus and online doctoral programs. Additionally, the present study had a goal to identify opportunities for improvement of the peer review process being examined.

This design required an analysis of peer interaction and peer reviews along with direct questions to doctoral dissertation students. The use of multiple layers of system data and participant responses through surveys and focus group interviews provided an opportunity for triangulation to identify any overlapping themes as well as any relevant gaps.

3.2.2 Researcher Role

Stake (1995) conveys that the role of the researcher may influence the case study design and deployment. He addresses implications of the researcher as advocate, biographer, evaluator, interpreter, or teacher. These roles have influenced the present study. He also states that "researchers do not step outside their ordinary lives when they observe and interpret, and write up the workings of the case" (p. 135). However, when the researcher is a participant of the case, this perspective becomes even more critical to assess. Creswell (1998) suggests that it will be important for the researcher to "comment on past experiences, biases, prejudices, and orientations that have likely shaped the interpretation and approach to the study" (p. 202).

The researcher of the present study is an internal researcher who is a participant of the program examined in the present case. The researcher is a graduate assistant of the program and assists the program leaders and students in various capacities. The researcher is intimately familiar with the program and the process and is well-known to the program participants. As a participant in the program, the researcher will serve as a peer reviewer and her work will be peer reviewed. Participants complete and

receive approximately 24 peer reviews throughout this six-step process. Costley (2010) claims that "when researchers are insiders, they draw upon the shared understandings and trust of their immediate and more removed colleagues with whom normal social interactions of working communities have been developed" (p. 1).

Costley, Elliott, and Gibbs (2010) highlight some of the benefits of being an inside researcher, including having access to participants and being intimately familiar with the case. Mercer (n.d.) cites a variety of literature to demonstrate that insiders have a better understanding of the participants, and typically a stronger rapport with study participants. In the case of the present study, the researcher has a passionate interest in the topic and a personal desire for it to be effective as she progresses on her own doctoral journey.

However, the literature reviewed cites several limitations of insider research. Creswell (1998) claims that the risks outweigh the benefits of insider research. Unluer (2012) warns of a loss of objectivity, while Costley, Elliott, and Gibbs (2010) warn of conflicts of interest. Additionally, Fleming (2018) claims there is a concern of lack of rigor and transparency. And participants may withhold responses for fear of being judged (Creswell, 1998; Fleming, 2018). Fleming elevates the concern of informant bias.

There are no intended conflicts of interest or confirmation bias in this study. The researcher did not intend to shape the outcomes of the present study. Member-checking was an important data collection and data analysis element of the present study in order to ensure that there was no confirmation bias. The program's doctoral program and its exam-dissertation design were both already established prior to the present research study, including the peer review process and the selection of CGScholar platform. The CGScholar platform includes a defined set of technical tools with minor configuration options. Separate from the design of the present study, as a part of the researcher's role as a graduate assistant, the researcher created a variety of resources to provide programmatic support to students, suggested deliverable-specific, rather than generic, peer review rubrics, designed the peer review assignment methodology, managed the peer review assignments and the progress tracker, and assisted students as necessary. While the researcher in her role as a student and graduate assistant provided process or program design suggestions to the program leaders, the purpose was for the benefit of the program and not associated with the present study. Program leaders ultimately made the decisions. Additionally, the researcher had no involvement in the assessment or formal evaluation of students or participants of the present study.

The researcher did not participate in the surveys, but her CGScholar data were used in the analysis if it related to one of the targeted study participants. Because the main goal of this study was to examine the relationship between sense of community and peer review, the researcher's contribution to

the data should have minimal to no effects. The *Validation and Triangulation* section of this work expounds on the steps that were taken to minimize the risks of the inside researcher approach. Additionally, the consent letter and all communications with participants reinforced the ethical elements of this study that there would be no retaliation or impact to participants' personal grades or outcomes as a result of the present study.

3.2.3 Mixed-Methods Exploratory, Intrinsic Case Study Approach

A mixed-methods exploratory, intrinsic case study design was selected in order to identify trends, causal relationships, and specific participant feedback. As an intrinsic case study, the focus of the present study is on the case itself (Stake, 1995). A mixed-methods approach is appropriate for the present research study because it capitalizes on the advantages of both quantitative and qualitative data collection and can minimize the risks associated with a solely qualitative or quantitative study.

The present study strives to provide "intensive analyses and descriptions of a single unit or system bounded by space and time" (Hancock, 2012, p. 10). A case also requires defining a beginning and end. The present study took place during a specific time period, which will be outlined in the implementation timeline section. While Denzin (2012) warns that triangulation does not mean mixed-methods, a mixed-methods design will enhance the triangulation of the data and help to explain some of the "why" behind the qualitative responses (Schutt, 2015).

In alignment with the attributes of an exploratory case study, the present study included multiple data sources to uncover a phenomenon of how sense of community and peer review relate to one another and to doctoral dissertation students' experiences and outcomes. These included surveys, focus group interviews, and system data. Miles (2015) considers case study research to be "in becoming a representation of places and practices at a particular point in time, case studies are crafted by researcher, and participant, decisions and choices of what is to be foregrounded and backgrounded, what is to be included and what is left out" (p. 312).

The quantitative data primarily came from the survey data and certain CGScholar platform metrics while the qualitative data came from focus group interviews, open-ended survey questions, and other CGScholar platform data, such as user annotations.

Quantitative data can influence the qualitative data collection design and process. Yin (1994) claims that "bringing qualitative and quantitative evidence and methods together will be the special strength of the case study method" (p. 287). The present study does not strive to establish generalizable results, but rather to inform others on this particular case and encourage readers to consider what might be relevant to their circumstances. The present case study is intended to provide insights (Ogawa & Malen, 1991) and influence changes or future designs (Merriam, 2001) of peer review experiences for doctoral

dissertation students. They are "suggestive and instructive, not definitive or conclusive" (Ogawa & Malen, 1991 p. 271). Therefore, the present case study will strive to provide deep evidence regarding the experiences of online doctoral students and peer review exercises.

Another goal of this case study was to demonstrate the complexity of the case, while enabling readers to comprehend the analysis of the study (Corcoran, Walker, & Wals, 2004; Miles, 2015). The case should engage the reader in making his or her own interpretations and applications. Denzin and Lincoln (2008) claim that qualitative research enables "psychological and emotional unity - a pattern – to an interpretive experience" (p. 7), while Stake (1995) considers qualitative research to be effective when it is holistic, empirical, interpretive, empathic, sensitive to risks of human subject research, and is validated.

3.2.4 Strengths and Limitations

A mixed-methods approach was selected in order to capitalize on the benefits of each method and also address the challenges. The strengths and weaknesses of case study research and quantitative research are common across the literature reviewed. The following summarizes the suggestions of Hancock and Algozinne (2006). Qualitative research typically takes more time than quantitative research due to the detailed amount of information to be collected, analyzed, and reported on. The present study deployed a mixed-methods approach in order to maximize the time available to conduct this study. However, the challenges associated with qualitative data collection were acknowledged, including complex data analysis, implying it may take longer than anticipated in order to adequately address the topic and research questions. A common challenge with qualitative research is ultimately knowing when enough data has been collected. In order to address these challenges, CGScholar system data was regularly downloaded and coded as it was generated.

Qualitative research can examine a larger variety of factors due to the nature of the data collection process, such as individual or focus group interviews where the researcher can adapt the interview based on the responses (both within a specific interview, but also across interviews). The quantitative elements of the present study were more limited based on the survey questions and system data available. However, the qualitative element of the present study examined a limited number of participants while the quantitative data attempted to reach everyone eligible for this study. While identifying participants in a qualitative study can be seen as a challenge, in the present study, access to participants was not a barrier.

A strength of the mixed-methods approach is the ability to report on the data in both a numerical and narrative way that adequately describes the case and its outcomes. Quantitative studies can sometimes be too numerical where readers aren't able to fully draw conclusions without adequate statistical knowledge. The present study attempted to illustrate and describe the quantitative data in a way

that would be understandable and meaningful for readers by providing narrative explanations of any statistical metrics used and conveying information in graphical formats.

Another factor affecting decisions to use a qualitative or quantitative approach involves the relationship of the researcher to those involved in the present study. In qualitative research, the goal is to understand the situation under investigation primarily from the participants' and not the researcher's perspective. This is called the emic, or insider's, perspective, as opposed to the etic, or outsider's, perspective.

3.2.5 Designing a Case Study

While it is commonly stated across the literature reviewed that case study research may be perceived as less rigorous and not generalizable, meaningful case studies are able to overcome these misperceptions by aligning the design with the work of several well-known case study researchers. The design of this mixed-methods case study relied on the work of Dumez (2015), Russell, Gregory, Ploeg, DiCenso, and Guyatt (2005), Stake (1985), and Yin (2014).

The present study considered the questions that Dumez (2015) asks:

1. **"What is my case a case of?"** *The doctoral dissertation experience of students as it relates to the effects of participation in peer review processes at a large research-focused university in the Midwest who started the program of study between August 2017 and Spring 2018*

2. **"What is the stuff that my case is made of?"** *Specific factors influencing peer review, including sense of community, and several outcomes being influenced by peer review*

3. **"What can my case do?"** *Inform others of the relationship between sense of community and peer review and other related factors and outcomes affecting the doctoral dissertation experience and identify opportunities for improvement of peer review exercises*

However, it was expected that adjustments would need to be made throughout the present study. Baxter and Jack (2008) suggest being specific about your scope, while Stake (1995) advises and warns that the scope and research questions may evolve as the case unfolds. Yin (2014) claims that discoveries will occur throughout the present study, which will in turn lead to adjustments in the design, making this a linear, yet iterative process. Baxter and Jack (2008) quote from Russell, Gregory, Ploeg, DiCenso, and Guyatt (2005),

> As a basic foundation to achieve this, novice researchers have a responsibility to ensure that: (a) the case study research question is clearly written, propositions (if appropriate to the case study type) are provided, and the question is substantiated; (b) case study design is appropriate for the research question; (c) purposeful sampling strategies appropriate for case study have been applied; (d) data are collected and managed systematically; and (e) the data are analyzed correctly (p. 556).

Stake (1995) outlines his approach to case study reporting, which serves as a valuable frame of reference in designing a case study. *Refer to page 123 of his book for additional details.*

1. Entry vignette
2. Issue identification, purpose and method of study
3. Extensive narrative description to further define case and contexts
4. Development of Issues
5. Descriptive detail, documents, quotations, and triangulating data
6. Assertions
7. Closing vignette

Yin (1994) identified seven case study techniques. The following indicates how the present study will address each of these techniques.

1. **"The use of multiple sources of evidence, in a converging manner"**: data collection will include a combination of surveys, focus group interviews, and system data, including peer review comments and annotations (refer to the Data Sources section and Appendices for more details)
2. **"The explicit specification and testing of hypotheses and rival hypotheses, especially in lieu of control or comparison groups"** (although Yin warns that this will become challenging as research subjects are "organizations" rather than individuals): Not applicable for this study
3. **"The dominance of deductive strategies, whereby research starts with theorizing"**: base this study on the theories of sense of community and new learning
4. **"Program logic models as a standard way of initiating a program evaluation"**: identify factors and outcomes, including short-term, intermediate, and long-term to aid in data collection focus and analysis
5. **"Pattern-matching as a common strategy for data analysis"**: establish a coding schema, especially for focus group and system data
6. **"Portfolio analysis, using qualitative criteria to differentially weigh the outcomes from a project or the projects within a program":** consider CGScholar system *dat*a as the "portfolio" and establish analysis criteria
7. **"The use of replication logic, rather than aggregating data, when comparing the results from multiple sites or cases"**: consider methods to replicate the data collection with future cohorts (p. 285)

3.2.6 Validation and Triangulation

Triangulation is not simply about multiple data sources, but more importantly, leveraging those data sources when stating the findings. As suggested by Baxter and Jack, (2008), in order to uncover more details and provide opportunities to validate the results, this case explored different contexts of the doctoral dissertation experience, including the peer review process, participation in the online peer community, and engagement in the group advising sessions. It was important to determine in what way

non-peer review processes were influencing the peer review experience and outcomes, and ultimately the results of the present study. The present study also included a specific focus group for participants who had completed the entire exam-dissertation sequence.

Elmore (2018), in speaking of good literature reviews, states that "literature reviews do not have to produce replicable results in order to be useful; they simply have to be clear about the judgments used to interpret the evidence" (p. 296). Similarly, Denzin & Lincoln (2008) argue regarding validity and triangulation that it is less about multiple sources saying the same thing, but rather there are many perspectives and sides that may not look the same from different angles or perspectives, similar to viewing a crystal. In response, the present case study considered students at different phases in the program. The data collection captured this meta-data. While each participant may have had the opportunity for similar experiences, participants will have had different life circumstances and attitudes towards peer review that may have contributed to the outcomes of the present study.

In addition to triangulation of data, Stake (1995) suggests that validity can be strengthened when the research "assists readers to make their own interpretation and recognition of subjectivity" (p. 48). While the intent of the present case study is not to convey some sort of causation, the study will aim to provide sufficient details that will enable readers to be able to determine how these results may be considered in different circumstances or contexts.

3.2.7 Case Details

Stake (1985) is explicit when speaking of case study design, that the core of the study is the case itself and should be described in much detail. He states that readers should be able have a "vicarious experience" (p. 63). The next section will briefly outline the factors associated with this case as it relates to the methodology plan, but a detailed description of the present case can be found within *Section 4.11*.

3.2.8 Factors Influencing Peer Review

To address the present study's research questions and gaps in the literature, and in alignment with the program's curriculum design, several peer review factors were selected as the foundation of the present study. There are several factors that may emerge as contributing to sense of community or task outcomes. The present study did not attempt to investigate these factors independently. However, the data collection will address these individual factors in order to make an independent or collective analysis possible.

This section briefly describes each factor, grouped into three themes: *Student, Peer Review Design, and Deliverables*.

(I) Student

- **Sense of Community**: Students' feeling of belonging and value and how that influences other peer review factors mentioned below
- **Motivation:** Students' desire to provide quality peer review feedback and engage in dialogue with authors
- **Perception:** Students' perception of the peer review process as an author and/or reviewer
- **Peer Review Experience**: How much training or experience a reviewer has had providing scholarly feedback to peers

(II) Peer Review Design

- **CGScholar Platform**: As described previously, this is an online peer community and learning management system that supports online peer reviews
- **Open Peer Review**: This refers to authors and reviewers being identified to one another
- **Authors as Reviewers**: Authors will also serve as reviewers of others' works
- **Peer Review Assignment Methodology**: A manual assignment process has been established to accommodate the needs and circumstances of students. This methodology will be explained later in this section.
- **Peer Review Rubric**: Several domains with descriptions and reviewer suggestions. The rubrics will be described in detail later in this section.
- **Annotations:** Highlighting text within the work and providing an explanation for the annotation
- **Dialogue:** Discussion between the author and reviewers
- **Self-Review:** Following the same rubric as the peer reviewers, authors rate themselves based on the rubric descriptions and also indicate how they felt they applied the feedback
- **Review of the Review:** Authors provide feedback to the reviewers to help them know how helpful their review was and aid in improving future reviews
- **Multiple Review Cycles:** A work is reviewed and revised and reviewed again

(III) Deliverables

- Draft submitted for peer review
- Peer Review Feedback and Annotations

Additional Factors

The present study acknowledged several elements associated with the program design that may have influenced the factors mentioned above and the outcomes mentioned in the next section. These factors were addressed as they had the possibility of being identified by the participants as contributing factors. In case study research, it was important to be in tune with variables outside of the present study's intended focus that may come up during the data collection process and/or help to explain the data analysis and findings.

Additional factors may include:

- The nature of other peer communities
- The nature of advising and support
- Evaluation processes and data analytics

Peer Review Experience

The following details are provided because the present study examined the level of peer review experience. The data collection considered the surveys, focus group interviews, and CGScholar data with respect to how many peer reviews a participant has completed up to the point of the data collection. The present study examined whether or not the amount of peer review experience a participant had plays a role in peer review outcomes. The amount of experience also enables a longitudinal perspective, which addresses a gap in the literature.

Students are required to take at least four core program courses during their regular coursework. Each of these courses incorporates two peer-reviewed projects along with a peer-to-peer learning community. Students are expected to anonymously review about three students' works for each project. The peer review process includes a rubric and the ability to annotate authors' works. Each student also receives about three reviews from peers per project. The peer review process within these courses is multi-faceted. The following guidance is provided to authors and reviewers:

- As a reviewer, gain ideas and insights on content and structure as you read others' works
- As a reviewer, critically think about someone else's work in order to provide meaningful feedback
- As an author, receive feedback to help improve your final work
- As an author and reviewer, incrementally improve your work and reviews as you progress through the program

By the time a student arrives at the exam-dissertation sequence within the doctoral program addressed in the present study, they will have provided and received about 24 peer reviews. Additionally, the goal is that by the time a student completes their final dissertation, the iterative work has already been reviewed multiple times.

CGScholar Platform

The peer review exercise delivery method and features were also considered, including how participants interacted with the platform and leveraged its features.

Peer Review Design

The present study aimed to determine how sense of community relates to the design of the peer review process within the doctoral dissertation setting, including the peer review assignment methodology

and the usage of ratings-based rubrics. Data collection strategies allowed participants to respond directly to questions associated with peer review design factors.

Work and Peer Review Deliverables

The work being reviewed is another factor that may influence the outcomes of a peer review exercise. Peer review data were incorporated into the data analysis in order to examine this factor. Additionally, the peer review deliverable itself may influence sense of community and was examined as a part of the present study. The "review of the review" system data and participant responses may provide evidence associated with this factor.

3.2.9 Data Sources

Three sources of data are included in the present study, including:

1. Survey that includes an adaptation of Rovai's Classroom Community Scale and additional questions
2. Focus Group Interviews
3. CGScholar System Data

Participant confidentiality was assured throughout the study, and participants were regularly advised that all comments will be anonymized or synthesized.

Amongst each of these sources, observations were made to determine if and how those observations should be included in the data collection and data analysis part of the study.

Surveys

Surveys are common data collection methods within quantitative research because one can generally reach a broader audience. Surveys are rarely mentioned when discussing qualitative research methods. However, Kelly, Clark, Brown, and Sitzia (2003) consider surveys to be relevant in descriptive, exploratory, and explanatory studies

Artino et al. (2014) found in their meta-analysis of medical education research studies that many surveys did not follow best practices and lacked rigor. As a result, they established the following seven steps to designing effective surveys and questionnaires.

1. "Conduct a literature review
2. Carry out interviews and/or focus groups
3. Synthesize the literature review and interviews/focus groups
4. Group items
5. Collect feedback on the items through an expert validation
6. Employ cognitive interviews to ensure that respondents understand the items as intended
7. Conduct pilot testing" (p.463)

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These steps were considered as a part of the present study. Focus group interviews were conducted early in the present study, which provided insights into revisions that may have improved the survey's alignment with the present study, while still serving as a post-course survey. This survey was an adaptation of Rovai's Classroom Community Scale *(See Appendix A).* A pilot test of this survey was not feasible as a part of the present study.

A survey was administered to all students in the exam-dissertation sequence being studied regardless of their stage in the sequence and regardless of the present study. This survey was administered once per trimester, for a total of four times during the present study. This served multiple purposes beyond the present study, including a baseline survey, periodic pulse check, an "exit survey" of the program, and to support future research.

The survey includes a combination of Rovai's Classroom Community Scale and additional questions to support the exam-dissertation sequence itself in addition to the specific factors being evaluated in this study. *Refer to Appendix A for specific survey questions.*

Sense of Community and Peer Review Survey and Scale

The Exam-Dissertation Sequence survey was developed as a recurring survey for all exam-dissertation participants separate from the present study. Students are asked to complete this survey at the beginning of their engagement with the sequence and then three times per year while they are actively participating in the exam-dissertation sequence. The survey provides multiple types of information:

- A participant's current progress in the six-course sequence and when they started the sequence
- A series of Likert scale questions addressing sense of community as they relate to the exam-dissertation sequence and peer review
- General comments

A survey completion quantity number (1, 2, 3, or 4), a completion date, and a respondent unique identifier was assigned to each survey, which was then used to correlate to the other data sources of this study. Several survey questions were used for comparison data, such as the number of courses previously completed or the current stage in the exam-dissertation sequence.

Sense of community-related responses were analyzed using a rubric to determine participants' overall Sense of Community scores. This score was then used to create strata in order to analyze the relationship with other data from the present study. Details on how this score is calculated can be found in Figure 3.4.

The open-ended comments were used to validate the quantitative data analysis. It is important to acknowledge that because the survey is optional, this may not include all students who are actively participating in the sequence or who have peer review data. Usage of peer review data without a related survey are outlined within Chapter 4.

Sense of Community Score Calculation

Calculating the Sense of Community score required assigning a numerical value to each response, with zero being the most negative response and four being the most positive response. Because some questions are written in the negative, a Strongly Disagree response would be assigned a four. The total points possible is 80 points. Participants have been organized into a low, medium, and high Sense of Community Score group for data analysis purposes. Figure 3.4 summarizes the methodology deployed in calculating the Sense of Community score.

Question Construction	Question Scoring
• Based on 20, 5-point Lykert-scale questions • Questions were written in either a positive or negative way (i.e. I do not feel a sense of belonging)	• Most positive response options assigned 4 • Lowest response options assigned 0 • Total of all responses, out of 80 points
Scores grouped into three designations	
Low: 0 to 25 **Medium**: 26 to 54 **High**: 55 to 80	

Figure 3.4 *Sense of Community Score Calculation and Group Assignment Methodology*

Sense of Community Score Change

The present study strived to demonstrate whether or not there is a change in sense of community as a result of the peer review process. The present study evaluated the change in Sense of Community score between each participant's first and final survey during the study time period. As stated previously, it was necessary to tag each survey as the participant's first, second, third, or fourth survey, as participants will have joined the sequence at varying times during the present study and/or may or may not have completed all surveys that were available to them. This has been identified as one limitation to the present study.

Focus Group Interviews

Focus group interviews are considered a reliable data collection source for qualitative studies because they provide the ability to gain a deep understanding of an issue with a specific group (Nyumba, Wilson, Derrick, and Mukherjee, 2014). However, this is typically not sufficient as a sole data collection method. Therefore, focus group interviews are a key data source to capture multiple viewpoints from a qualitative perspective and to complement the survey and system data being collected in the present study. The goal of the focus group was to capture descriptions, explanations, connections, and more (Stake, 1985).

Creswell (1998) outlines several challenges in conducting interviews (individual or focus group), such as the difficulty in asking the right questions, adapting to limited responses, and note-taking. Additionally, as with other qualitative data collection methods, the time commitment to conduct these focus group interviews was considered.

Approach

The first two focus group interviews were open to all active exam-dissertation sequence students. Participation was voluntary, but required a signed consent form. Three focus groups were held remotely via Zoom and were scheduled for 60 minutes in order to respect people's time and to not lead to response fatigue. Participants could participate by audio and/or chat and could exit the session at any time. The chat was not monitored as a part of these focus group sessions. The interviews were not recorded, but notes were taken without names and the chat transcript was retained, with all names removed immediately.

Participants were not required to enable their video, but they had the choice to do so. Because these interviews were conducted remotely and not all participants had their video enabled, it was not possible to capture physical observations of respondents. However, this is not considered a limitation of or critical to the present study.

The goal of the focus group questions was to determine if students feel a sense of community during the dissertation process and whether that influences the peer review quality and outcomes. Questions also addressed the peer review factors and whether they felt those impacted their experience and outcomes. *Refer to Appendix B for specific focus group interview questions.*

The final focus group interview questions were established after preliminary survey analysis was complete in order to determine the key information that was lacking in order to more completely address the research questions of this study and enhance the validity and reliability of the data and study. Only participants who had completed the entire exam-dissertation process were invited to participate in this final focus group interview.

The focus group interview responses were not individually coded or specifically correlated to individuals' survey responses or CGScholar data. However, some direct quotes were captured and anonymized to include with the summary of research findings in Chapter 4.

Community and Peer Review Platform Data

One of the purposes of CGScholar is to enable peer-to-peer learning. CGScholar includes robust metrics that are captured based on user interaction with the system and with one another within the system. This includes their contributions in the community as well as their usage within the CGScholar Creator function. Within CGScholar Creator, there is a feedback component that supports annotations,

peer reviews, self-reviews, instructor/admin reviews, and a rating of the feedback received. It also supports a dialogue and comments feature. Each of these interactions is captured. For example, the system is able to report on how many annotations per work as well as an average number of annotations across all works within a particular publisher community.

These data are unique because they are automatically captured and can tell a story on their own. The data were used to support self-reported data by participants in the surveys and focus group interviews. The data include numerical metrics, but also provide access to the actual works, annotation text, peer review comments, and any dialogue that may take place within the platform.

CGScholar Data Available

Certain CGScholar data are available to and for any student who has taken a course using the CGScholar platform sponsored by the program addressed in the present study. Students have access to their own metrics while administrators have access to all students' metrics. Students' names are identified in the metrics, but were immediately coded as a part of this study to maintain confidentiality. Data from the Analytics engine was exported into Excel format in order to be analyzed in addition to a custom report that included more granular and review-specific data.

For this study, two types of CGScholar system data were available. *See Appendix C for CGScholar data fields.*

(I) Exam-Dissertation Community and Publisher Data

This is a set of predefined metrics that are an aggregate of CGScholar community data and are not work or contribution-specific. For example, if an author has created two works in the community, the Word Count metric would consider an average across both works. These metrics are updated once a day. Individual metrics are available to each student and a summary and individual view is available to community administrators. *Refer to Appendix C for specific metrics.* Not all metrics from this data set will be necessary for the present study.

(II) Works and Peer Review Data

A custom report was designed and developed to accommodate the present study, but can be used for program-specific purposes. It can be generated on-demand for any community within CGScholar. This report is only available to community administrators and is not available to students or participants of the present study. The report provides data for each work and peer review that has been submitted. Names are captured in this system data, but were immediately coded to maintain confidentiality while still being able to correlate with other data sources.

3.2.10 Data Analysis

The goal of the data analysis was to provide a reliable and valid way to report on the data that were collected and describe it in a way that is meaningful for the readers of the present study. The data were analyzed in multiple ways. This section briefly describes a high-level analysis plan, while Chapter 4 expounds on this analysis and correlates it to findings and results. The data analysis includes four types of metrics:

1. Overall Participation/ CGScholar data grouped by time period
2. Sense of Community score group, organized by time period
3. Change in Sense of Community score and group
4. Qualitative Survey and Focus Group data

Overall participation conveys the dependent variables of this study, including how many participants responded to the surveys, attended focus group interviews, or created works or completed peer reviews. It also examines specific contributions, such as how many words or the number of annotations.

The methodology used to calculate participants' Sense of Community score and their group assignment is outlined in *Section 3.2.3*. These data were used to demonstrate whether or not a change occurred during the present study, as outlined in the *Time Periods* section that follows. Qualitative data from both the Exam-Dissertation Sequence survey and focus group interviews were coded throughout the study and used to support findings from the quantitative data.

Time Periods

In order for the data analysis to address the research questions and hypotheses of the present study, it was necessary to segment the data based on certain time periods. The four time periods were based on the administration of the Exam-Dissertation Sequence survey, which was first conducted in January 2020.

- #1: September 2018 to January 31, 2020
- #2: February 1, 2020 through April 30, 2020
- #3: May 1, 2020 through July 31, 2020
- #4: August 1, 2020 through January 10, 2021

In addition to the surveys, CGScholar data was also tagged with a specific time period prior to completing the data analysis.

3.2.11 Validating Findings

The data collection and analysis in the present study strategy strive for triangulation in order to provide different opportunities to address key questions. Open-ended survey responses and focus group interviews were used to triangulate the quantitative data mentioned previously in this analysis plan.

In order to enhance the validity and reliability of the data outlined in this work, the peer review process was relied upon as a part of the present study's final output. Three students who participated in

the study served as peer reviewers of both incremental progress and the final work. This "member-checking" provided an opportunity for participants to not only provide feedback on the work itself, but also to validate the findings. Stake (1985) considers member checking as a form of triangulation and acknowledges while the volume of feedback may be minimal, it is a necessity.

3.2.12 IRB

An IRB application was submitted and received approval. IRB Materials can be found in Appendix E, F, and G.

CHAPTER 4: RESULTS, FINDINGS, AND DISCUSSION

This exploratory, mixed-methods case study examined the relationship between sense of community and the peer review experience as well as the factors that emerged as the constitutive elements of sense of community with doctoral dissertation students. The results and findings of the present study provide a holistic view of the case, supported by both qualitative and quantitative data.

This chapter begins with a detailed description of the case itself, followed by an overview of the data collection process. It then examines the participation and contributions of the participants within the exam-dissertation sequence, the level of sense of community and peer review perceptions. This chapter concludes with brief descriptions of the factors that participants reported contributed to their level of sense of community, including synchronous group advising sessions and elements associated with the peer review process.

4.1 Research Project Execution

The present study involved the peer review experience of Learning Design and Leadership online Doctor of Education students. The present study was formally conducted between March 1, 2020 and January 10, 2021, and leveraged existing processes and historical data associated with the participants of the present study since September of 2018. The first survey used within the present study was conducted in January 2020 as a new part of the program curriculum.

This section describes the research site, including the program design and technical platform used to administer the online community and peer review process, which is the foundation of the present case study. It then provides an overview of the participants of the present study. It concludes with a high-level summary of the data collection procedures and challenges experienced with the data analysis of the present study.

4.1.1 Research Site – Case Details

Program Context

It is necessary to articulate all components of the program that were studied to have a holistic view of the present case. As stated previously, the present study considered the possibility that the program components may have influenced the sense of community, peer review experience, and/or dissertation outcomes. Additionally, these program components were considered when determining the data sources and developing the data collection instruments of the present study.

The Doctor of Education degree addressed in the present case was introduced in August 2017 and attracts working professionals from a range of fields. The program of the present study is one of four programs offered by the department sponsoring this Doctor of Education degree. It uses an experimental learning management system called CGScholar to harness and test Cope and Kalantzis's (2012) seven affordances of digital learning to enhance collaboration, peer-to-peer feedback, multimodal text production and to provide ongoing formative assessment.

Pedagogy

The pedagogy that underpins the program of the present study has an epistemological orientation, including scaffolding activities around four knowledge processes: Experiential, Conceptual, Analytical, and Applied. (Based on the research of the Learning by Design and Multiliteracies project.) Its pedagogy also deploys peer-to-peer learning and is supported by resources, requirements, and administrative logistics.

Learning Resources:

1. Course-level peer communities
2. Synchronous course sessions
3. One-on-one supervisory sessions
4. Additional peer community and bootcamps (not course-specific)
5. Virtual peer-initiated meet-ups and writing sessions
6. Teaching assistant and advisor support
7. Program web site
8. Job aids and guides
9. Exam-Dissertation peer community
10. Exam-Dissertation optional synchronous group advising sessions

Program Requirements and Logistics:

- Students are required to take four essential core courses and are placed in peer learning communities and attend synchronous course sessions. Students from all disciplines are invited to enroll in these courses.
- Students are required to complete four to six peer reviews per core course and should receive a similar number of peer reviews of their work. *Refer to section 3.2.8 Peer Review Experience for details on the peer review process.*
- Students are not assigned a cohort nor a sequence in which they must complete their regular courses.
- Students are encouraged to take courses outside of their specific concentration.

- Students have a choice of over 30 elective courses and attend with students from other online or on-campus programs.

- Students are required to complete at least two research methodology courses, one of which is the same for all students within the department. Additionally, students complete a third methodology research seminar as a part of the exam-dissertation sequence (see below).

- Students must have completed all required coursework before they can begin the exam-dissertation process; however, occasionally exceptions are made if a student has one non-research methodology course remaining.

- Students are required to complete a six-step exam-dissertation process, including the methodology research seminar referred to previously. This six-step sequence is outlined in more detail in the next section and serves as the premise for the present study.

Exam-Dissertation Sequence

The exam-dissertation sequence is organized into six steps, as stated previously. Each step in the sequence is intended to enable students to build towards their final dissertation. The dissertation requirements within these six steps vary by program within the university where the present study was conducted, and even within the department where this doctoral program addressed in the present study is housed.

Six Steps

1. General Field Research Seminar and Exam
2. Special Field Research Seminar and Exam
3. Methodology Research Seminar
4. Preliminary Manuscript and Oral Exam
5. Full Draft of Dissertation and Peer Oral Presentation
6. Final Dissertation Manuscript and Oral Defense

Each seminar course and where applicable, a related exam, must be completed before beginning the next step in the sequence. Students may complete their exam-dissertation process at their own pace, but must complete it within the university's required timeline.

4.1.2 Elements of the Six Steps for the Program of the Present Study

The research seminars that make up the exam-dissertation sequence include the following elements to support students throughout the process:

- An **online peer community** with a series of "admin updates" that ask students to comment and create content that helps build towards their peer-reviewed projects and dissertation.

- **Synchronous, weekly group advising sessions with supervisors** at multiple times to accommodate varying time zones and schedules.
- As needed, **one-on-one instructor supervision**.
- A series of **nine peer-reviewed projects** that help build towards the student's final dissertation. Each terminal work is a cumulative draft of the student's dissertation.
- Approximately **24 Peer Reviews** with a corresponding ratings-based rubric.
- **Advisor Review** of each terminal deliverable, including prior to committee review where an examination is required.
- **Exam-Dissertation Committee** that provides ultimate feedback and approval on the terminal deliverable of each exam, including the preliminary and final oral exams.
- A **transparent progress tracker** where students self-report their progress on a shared Google sheet only visible to program participants and their supervisors.

Work Submissions, Peer Reviews, and Community Contributions

The present study relied on specific participant roles and contributions, as outlined in Table 4.1. Students in the program of the present study are expected to participate in the peer review process by completing three peer reviews per type of work submitted. The program goal is that each student will in turn receive three peer reviews per work. Works submitted represent iterative and interim versions of what will become the student's final dissertation. Students have opportunities to engage in each type of interaction multiple times throughout their experience. Students are repeating the cycle of receiving informal or formal feedback from peers, advisors, and committee members, which includes revising, augmenting, and ultimately refining their work. In addition to descriptions of each role and contribution type, Table 4.1 demonstrates the participation based on these roles and contribution types out of a total of 59 unique participants in the present study.

Roles	N	Contributions	N
Survey Respondent: participant responded to at least one survey	52	Survey Responses across four different times periods	108
Focus Group Attendee: participant attended at least one focus group interview session	16	Focus Group Interview Responses	N/A
Author: participant created at least one work (project)	43	Works (Written Projects)	201
		Words	2,791,142
Peer Reviewer: participant completed a review of at least one peer's work	54	Peer Reviews: Includes a ratings-based rubric with an area for comments for each rating item	505
		Peer Review Comments	259,095
		Peer Review Annotations: Students track changes and comments using the CGScholar annotation tool while completing peer reviews	12,489
Community Participant: participant posted at least one comment or individual update within the Exam-Dissertation Sequence community	57	Peer Community Updates	404
		Peer Community Comments	1,339

Table 4.1 Participant Roles and Contributions

The present study included 59 unique participants, with 43 submitting at least one work for peer review and 54 completing at least one peer review. All 43 authors had also completed at least one peer review. Six additional surveys were completed by respondents who had not participated as an author, reviewer, or community contributor, but had officially begun the sequence prior to the conclusion of the study. Sixteen participants attended at least one focus group interview. An additional student contributed only to the online community and was excluded from this study.

As stated in Table 4.1, there were a total of 201 works submitted for peer review and 505 peer reviews across all participants. This resulted in an average of 2.5 peer reviews per work submitted. The 201 works created included an aggregated total of 2,791,142 words. Of the 201 works submitted, four had not yet received any reviews at the conclusion of this study. Of the 505 peer reviews, 12,489 annotations (average of 24.7 per peer review) and 259,095 review comment words (average of 513 per peer review) were included.

In addition to the peer-reviewed works, students are asked to contribute individual updates to the peer community and comment on peers' and instructors' updates. These serve multiple purposes, including connecting with peers, sharing their progress and knowledge, and receiving interim feedback from peers. Students contributed 404 community updates and 1,339 peer community comments.

Examples of community updates included samples of published literature reviews with student critiques or portions of their own iterative work seeking preliminary peer feedback.

A common theme that emerged often from the open-ended survey questions and the focus group interviews was the value of serving as a peer reviewer. A survey respondent shared "sense of community probably contributes to peer review; it goes the other way; the fact that we are doing peer reviews contribute to the sense of community that we have; it essentially feeds one into the other; where we stumble, how we move along, how we improve our work, etc." Multiple participants in both the surveys and focus group interviews reported that reviewing others' works was sometimes more valuable than the reviews they received. Participants appreciated the opportunity to see examples before completing their own work. However, this was also presented as a challenge by more than one participant during a focus group interview, that due to their stage in the process, there were not always examples to review. Some participants admitted that completing the reviews was not always enjoyable, either due to time constraints, lack of knowledge of the topic, or overall poor-quality work. However, one participant claimed to enjoy researching another person's topic. The concept of similar topics is addressed later in Section 4.3.3. Generally, the focus group participants agreed that their own work improves because they are a peer reviewer for others. To further support this finding, 45 out of 52 participants in their final survey reported they strongly agree or agree that their own work improves as a result of peer reviewing others' work. Five participants were neutral while the other two disagreed or skipped the question, respectively.

4.1.3 Program Evolution

For informational purposes, while the program being studied launched in August 2017, the program's regular courses underwent certain revisions in March 2019. The changes intended to provide additional opportunities for students that might prepare them for the exam-dissertation sequence and improve their contributions as a peer reviewer. It was anticipated that these changes would have an impact on the outcome of the present study, as compared to a similar study that may have been conducted a year ago or that may occur in the future.

The main changes included:

- Separate peer learning communities for doctoral students to enable students to more easily connect with those in their degree program (separated from Master's students). Note that this approach changed again in June 2020, but did not impact participants in the present research study
- Peer-reviewed projects focused on scholarly writing, including a literature review
- Streamlined exam-dissertation peer community

In addition to an ongoing increase in program participation over the course of the present study, the exam-dissertation sequence process is relatively new and benefits from an agile process that involves ongoing enhancements as a result of student feedback and outcomes. In June 2020, midway through this study, changes were made to the exam-dissertation sequence. Examples of this evolution include more structure, enhanced guidance, increased support documentation, and additional scaffolding.

In July 2020, a few requirement decisions were implemented related to the third step in the exam-dissertation sequence:

- Elimination of the Methodology Exam by the department. This should have had minimal impact on the outcomes of the present study due to the timing and also because the methodology research seminar is still required and involves similar steps, with the exception of the committee evaluation.
- Elimination of the Methodology Annotated Bibliography peer-reviewed project.
- Theory/Methodology Chapter divided into two peer-reviewed projects. The first work addressed the theory and methodology selection and rationale while the second work addressed the methodology implementation, such as data sources and data analysis. This separation enabled students to receive interim peer and advisor feedback on their selected methodology.
- Advisor feedback on both Theory/Methodology Work 1 and Work 2.

Additionally, all rubrics were simplified to include a three-point scale, rather than a five-point scale. This revised scale intended to communicate to authors whether or not their work needed improvement in any of the rubric domains, with the comments serving as the medium to convey more detailed feedback and the significance of the improvements needed.

Participants in the first time period may have a different outcome than those in the second, third, or fourth time period. In order to appropriately represent the findings of the present study and potential variances due to these factors, the following sections of this work will include segmented data based on these time periods, increasing the credibility of the present study's findings.

4.1.4 CGScholar Platform

The platform used in this study is CGScholar, a web-based online community and learning management system. *Refer to Section 3.2.3 and the section that follows for additional details*. While CGScholar was the predetermined platform for the doctoral dissertation process associated with the present study, the ultimate reason this platform was selected for the present study was due to its alignment with the theoretical concepts underlying the present study. It supports peer-to-peer learning and

community-building, ubiquitous learning, and much more. Each feature of CGScholar enables the peer review process referred to in the present study to occur.

1. Authors can draft a work, complete a self-reflection, and have the work routed for peer review.
2. A review rubric can be assigned to a work and completed by one or more reviewers.
3. Reviewers can annotate the work directly within the platform.
4. Authors and reviewers can dialogue within the annotations or review rubric.
5. Authors can rate their reviewers.
6. A work can continually be revised and routed for instructor review.
7. A work can be duplicated, revised, and then re-routed for an additional round of peer and/or instructor review.

CGScholar Platform Details

The CGScholar ecosystem is explained in *Appendix D*. This linked post descriptively compares CGScholar to other Learning Management Systems. As described in the linked document, CGScholar includes the core elements outlined in Figure 4.1.
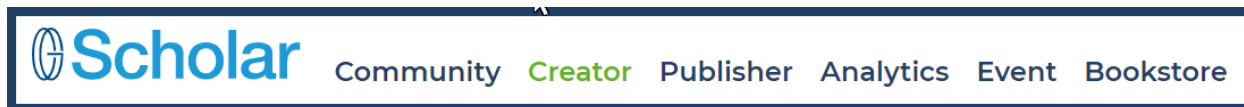

Figure 4.1 CGScholar Menu

CGScholar Applications Menu

1. **Learning Communities** to deliver course content and engage in peer collaboration
   - **Activity Streams** within and across learning communities to always see the latest updates and comments
2. **Creator** space that supports creating and reviewing works
3. **Publisher and Bookstore** provides the ability to share students' work with peers, communities, or a broader audience
4. **Data Analytics** based on knowledge, help, and focus algorithms and artificial intelligence

The remainder of this section will explain specifically the CGScholar Creator application, including the Feedback feature.

CGScholar Creator

CGScholar Creator supports students responding to a specific "work request" or creating their own works. It supports different types of works and work structures, such as a paper with headings and

subheadings, as illustrated in Figure 4.2 or a learning module format that supports instructor and student content that can be posted to a learning community.
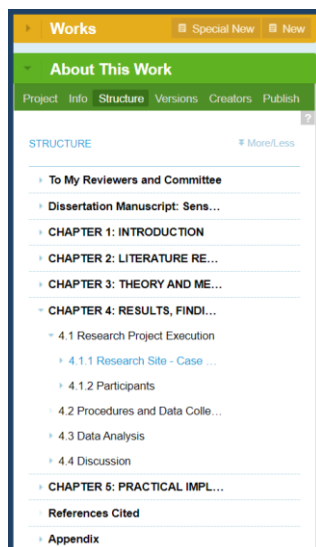

Figure 4.2 *CGScholar Creator - Structure Example Menu*

CGScholar Feedback Feature

Within CGScholar Creator, users have access to an online CGScholar Feedback application. This includes annotations, a ratings and comments-based rubric, and a rating and comment for the review received. Authors can dialogue with reviewers by commenting on the annotations and the rubric items. A work is first connected to a CGScholar community publisher with the desired peer review settings and rubric enabled, and then the peer reviewers are assigned.

Figures 4.3 and 4.4 reflect a sample rubric with descriptions for each rubric domain and a reviewer's responses, respectively. On the right of Figure 4.4 you can see how reviewers can rate a particular domain and add comments.
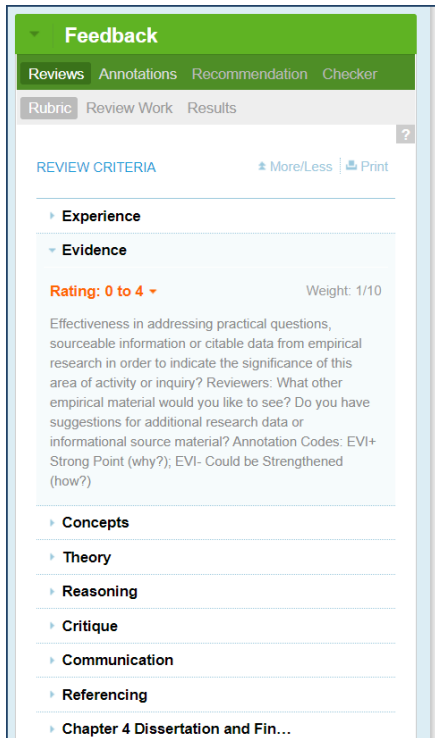
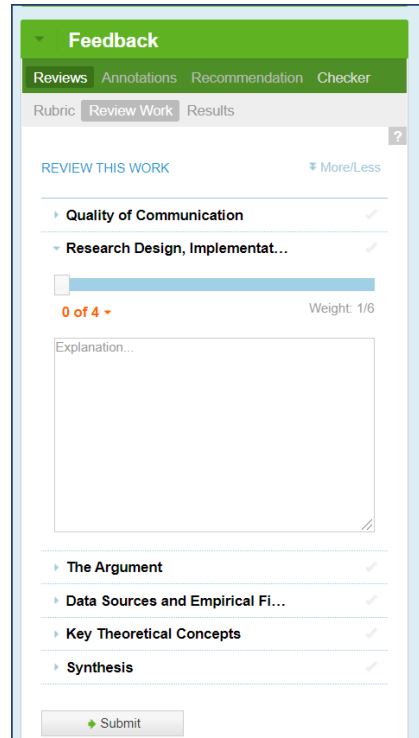***Figure 4.3*** *CGScholar Creator – Feedback Rubric*

Figure 4.4 *CGScholar Creator – Input Feedback*

Once reviewers have submitted feedback, the author can view a summary rating along with individual ratings and comments. Authors can also dialogue with their reviewers using the comments feature. Figures 4.5 and 4.6 provide a visual of this feature.
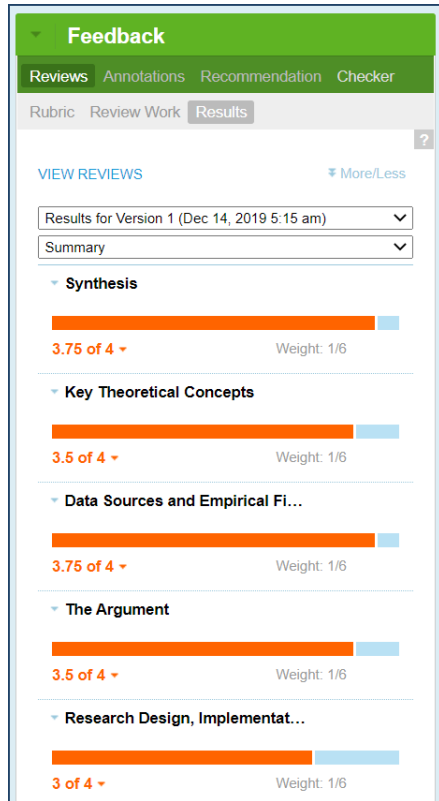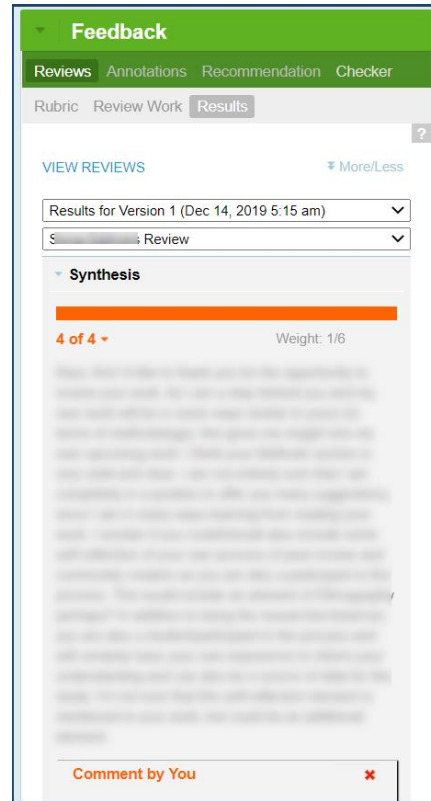
Figure 4.5 *CGScholar Creator – Summary Results*

Figure 4.6 *CGScholar Creator – Individual Results*

Figure 4.7 reflects the CGScholar Annotations section where users can highlight a section of text and add an annotation that ties directly to text within that version of the work. Authors can view and comment on those annotations.
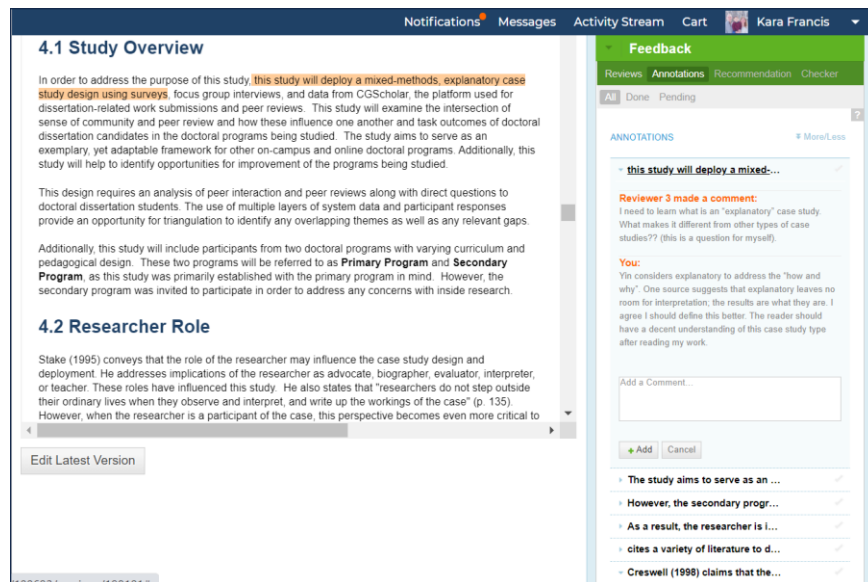

Figure 4.7 *CGScholar Creator – Annotation Feature*

Each of these features contributes to the experience and outcomes of the peer review process. Additionally, data associated with these features were used to address the research questions and hypotheses of the current study.

4.1.5 Participants

Online doctoral programs and courses continue to emerge each year that replicate or augment institutions' on-campus offerings (Brett, Lee, & Oztok, 2016; Fuller, et al, 2014; Byrd, 2016). These numbers have also increased significantly due to the implications of COVID-19 and many universities moving to a hybrid or fully-online model for one or more semesters. Many of these higher education institutions have existing online Master's programs. The needs between Master's and Doctoral students differ, especially in the context of the dissertation. It is not surprising that attrition is high in online graduate programs (Grady, 2016) due to the potential isolation (Berry, 2017), limited access to resources that are available on-campus, cultural challenges (Deshpande, 2016), and/or life distractions that are typical of online graduate students (Halter, Kleiner, & Formanek Hess, 2005).

The present study involved a purposeful sample of students working on their dissertation as a part of an online Doctor of Education program with a concentration in Learning Design and Leadership at the University of Illinois at Urbana-Champaign. The curriculum design of this program addresses the peer review challenges mentioned in *Section 2.3*. This group was selected for the present case in order to provide a focused and targeted data collection process and because all participants used the same platform to engage in the peer review process.

Baseline data for participants beginning the exam-dissertation process at the time of the present study were included, but were not collected for participants who had already begun their exam-dissertation process prior to January 2020. During the planning of this study, it was anticipated that about 10-15 existing participants would be included with an additional 15-20 new participants joining at some point during the study. However, by the conclusion of this study, there were 59 total participants. In case study research, the sample size of the present case allows more detailed data to be gathered about the participants. This sample size also aided in minimizing the risk associated with the inside researcher element.

Participants in the present study are primarily experienced professionals attending graduate school part-time and typically working full-time. Examples of employment disciplines include early childhood, primary, secondary, or higher education, workplace learning, and more. The majority of the students are also raising families. Participants reside in one of multiple countries, including the United States, Argentina, United Arab Emirates, Taiwan, and Switzerland. While participants in the program participate fully-online with no on-campus requirements, online courses or online programs are not the

focus of the present study. However, this element is important to acknowledge, as sense of community may differ between in-person and online learning environments.

The doctoral program addressed in the present study launched in August 2017 with about sixty students. By August 2019, twelve students had begun the exam-dissertation process. As a result, early in the data collection time period, only eight students had begun the exam-dissertation sequence. By the conclusion of the study, 54 of the 59 participants had engaged in at least one peer review or submitted their own work for peer review. Additionally, nine students (not all the same as the eight referred to previously) completed their final defense and graduated prior to the conclusion of this study.

4.2 Procedures and Data Collection

Data were collected both systemically through electronic surveys and CGScholar and manually through focus group interviews. *Refer to Section 3.2.3 for additional details*. All data, except for the focus group interviews, were collected as a part of the standard curriculum and system design. All data were stored on a secure network.

Preliminary quantitative and ongoing qualitative data analysis were both conducted periodically throughout the duration of this study. Survey data, focus group interview responses, and system data were each analyzed individually and in relation to one another. At the conclusion of the present study, a final quantitative analysis was conducted on all survey and system data and organized into four time periods.

4.2.1 Time Periods

Data sets for this study have been organized into four time periods based on the administration of the exam-dissertation sequence survey to demonstrate if there is a relationship between sense of community and the peer review experience, and/or if there was a change in sense of community during the study time period.

Four Time Periods

1. September 2018 through January 31, 2020
2. February 1, 2020 through April 30, 2020
3. May 1, 2020 through July 31, 2020
4. August 1, 2020 through January 10, 2021

Participation by Time Period

Participation, both in the case of distinct students and their corresponding contributions, increased throughout the duration of the present study due to more students reaching the first of the six milestones. Figure 4.8 demonstrates the participation variance throughout this study. With the program of the present study launching in August 2017, it was expected that during the early years of this program, the number of participants at this stage would be low. Students must complete all required coursework prior to beginning the exam-dissertation sequence. In September 2018, only six students were actively engaged in the exam-dissertation sequence. By 1 January 2020, still only 14 students had submitted at least one work for peer review, however, by the conclusion of this study on 10 January 2021, 43 students had submitted at least one work and 54 students had completed at least one peer review. Sixteen participants attended a focus group session during the third time period and five participants attended the focus group during the fourth time period. The amount of works submitted gradually increased during each time period. The number of peer reviews was similar during the first two time periods. The average peer reviews received for each author was lower during the second time period than during the other three time periods.

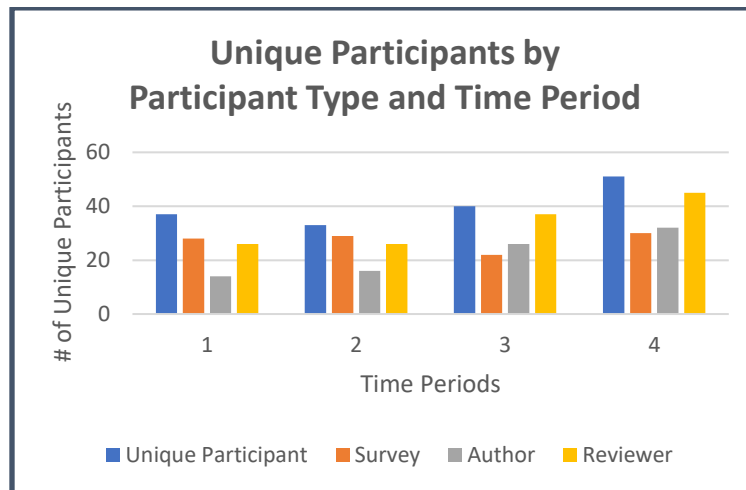*Figure 4.8* Overall Participation, by Time Period and Participant Role

The present study aimed to examine the intersection of peer review submissions, including corresponding contributions, and Sense of Community Score. Table 4.2 conveys the amount and types of data collected during each time period. The data were then related to data that will be discussed within Section 4.3.1 (Sense of Community).

Time Periods / Contributions	#1	#2	#3	#4	*Study Duration*
Unique Authors or Reviewers	26	26	38	47	*56*
Survey Respondent	28	29	22	30	*52*
Completed All 4 Surveys	N/A	N/A	N/A	N/A	*6*
Completed Survey Only	11	7	2	4	*4*
Focus Group Attendee	N/A	N/A	16	5	*21*
Unique Authors	14	16	26	32	*43*
Works Authored	48	27	50	76	*201*
Unique Reviewers	26	26	37	45	*54*
Reviews Contributed	127	71	128	179	*505*
Annotations Recorded					*12,489*
Peer Community Updates	N/A	N/A	N/A	N/A	*404*
Peer Community Comments	N/A	N/A	N/A	N/A	*1,339*

Table 4.2 Overall Participation, by Time Period and Participant Role

Student Milestones

The types and lengths of works vary throughout the exam-dissertation sequence. As a student progresses through the sequence and meets certain milestones, their work is longer and becomes of greater significance. While the length of the work increased, the data did not reflect a consistent increase in annotations or peer review words. One possible explanation is that reviewers did not review the entire work and only reviewed the specific part of the work that was considered to be "new". The goal of the exam-dissertation sequence is to enable students to work towards their final dissertation manuscript through the series of incremental and iterative works. Students are asked to provide a note to reviewers at the beginning of the work to indicate what they changed from their previous version and what part of their work is new and should be the focus of the current review.

Peer reviewers may be selected from all stages regardless of the author's stage and the work type submitted. Figure 4.9 represents the stages of participants across each time period within the present study, as reported by participants when responding to the Exam-Dissertation Sequence survey. This figure demonstrates the increase in participation and the progress of students throughout the duration of the present study. Refer to *Section 4.1.1 Case Details* for the six-course sequence outline. By the conclusion of this study, 56 students had begun or completed the first course in the sequence. As a part of this sequence, they may have provided a review for a peer at any stage in the sequence.
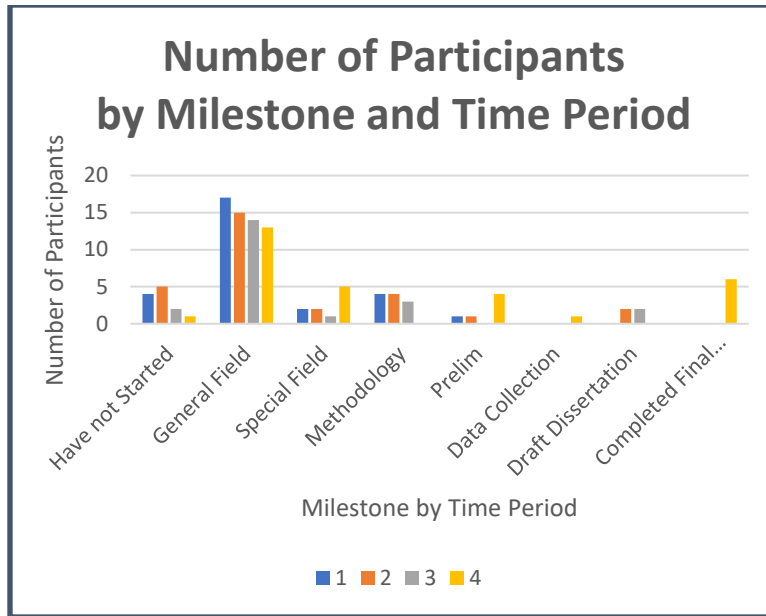
Figure 4.9 *Overall Participation, by Milestones and Time Period*

This study hypothesized that engagement in the peer review process was related to sense of community. The general metrics outlined in this section provide context for the data and related discussion outlined in the following sections.

4.2.2 Data Sources

The survey data provided insights into the level of sense of community for each participant, while the focus group interviews and system data served as supporting data. The following information provides a high-level description of the three main data sources, including the overall participation metrics. The sections that follow provide specific results and findings from the data collection and analysis process. *Refer to section 3.2.3 for additional details on each data source*.

(I) Historical Surveys

An electronic survey was administered through CGScholar four times during the duration of this study as a part of the program curriculum. Links to the surveys were posted within the exam-dissertation sequence community and reminders were sent periodically within course announcement emails. Intervals of the survey distributions aligned closely with the end dates of each trimester; however, participants may have taken the survey at any time during the following two to three months until the next survey distribution became available. Two participants completed an existing survey after a new survey was distributed, but the previous one had not yet been marked as inactive. Those surveys have been grouped into their respective timeframe rather than the exact survey they took, since the survey questions were the

same in these situations. One participant took the same survey twice. The second survey was excluded. Additionally, one person completed a partial survey, but had not yet engaged in any activity associated with the exam-dissertation process and was therefore excluded from this study.

Overall participation increased throughout the duration of this study as students arrived at the beginning of the exam-dissertation sequence, concluding with 59 participants. However, the number of survey respondents did not increase at the same rate. In fact, during the third time period, survey participation decreased while the overall participation in the exam-dissertation sequence increased. The survey distribution time periods and respondent rates are outlined in Table 4.3. Fifty-two participants responded to at least one survey and 31 participants responded to more than one survey during the present study's time period. Six participants responded to all four surveys.

Time Period	Total Participants	Survey Respondents	Percentage
1	37	28	75.7%
2	33	29	87.9%
3	40	22	55%
4	51	30	58.8%

Table 4.3 Survey distribution and response rates

(II) Focus Group Interviews

Virtual focus group interviews were conducted using Zoom as a part of the present study, as explained in *Section 3.2.3*. Data from the focus group interviews conducted on 29 June 2020, 1 July 2020, and 7 December 2020 were documented during the interview session and researcher notes were stored on a secured drive. Focus group data from the first two sessions were analyzed within the duration of the present study to identify themes and opportunities for any adjustments to the research study methodology. The focus group interviews were intended to provide qualitative data, but also to serve as an opportunity for triangulation of the other data collection methods.

The first two focus group interviews were open to all study participants and served the same purpose. Two sessions were scheduled at different times to accommodate varying residential time zones and participant schedules. Twelve participants attended the first focus group session while three participants attended the second focus group session. A third focus group session was scheduled closer to the conclusion of this study that was restricted to only those who were scheduled to graduate in December 2020. Five participants attended this focus group interview.

The focus group interview data primarily informed the second research question of this study, which related to program and peer review factors that emerge when asked about sense of community.

Following the first set of focus group interviews and two surveys, coding of the focus group comments and open-ended survey results began in order to identify any recurring themes that may have emerged. Each response was written as a simplified comment capturing key words. Preliminary themes were identified based on those key words and anecdotal observations by the researcher. The final themes and theme assignments were completed at the conclusion of the present study. These are discussed later in *Section 4.3.3*.

(III) CGScholar Data

The present study relied extensively on system data captured by CGScholar as a part of the work submission and peer review process. *Refer to Section 3.2.3 and Appendix C for specific details*. A specific report was developed in order to extract existing data. Specific data used within this study included all projects submitted within the current and previous exam-dissertation sequence peer communities, with the original community launching in September 2018. The first community was decommissioned in June 2019 when the current community was set up. All students transitioned to the new community.

CGScholar system data were captured automatically prior to and throughout the duration of this study as a part of the standard curriculum and processes. Data were downloaded periodically to assess the meaningfulness and credibility of the data analysis strategy. A final report was downloaded on January 11, 2021, from both exam-dissertation sequence communities, which included all peer review data captured since the exam-dissertation sequence had its first student in September 2018 through January 10, 2021.

As stated previously, participants created 201 works with an aggregated total of 2,791,142 words. Of the 201 works submitted, four had not yet received any peer reviews at the conclusion of this study. Participants also contributed 505 peer reviews with 12,489 annotations and 259,095 review comment words. Two reviewers were excluded from the totals, and subsequently two reviews have been excluded, as they were submitted by an advisor. More detailed analysis and findings will be discussed later in this chapter.

4.3 Summary of Results and Discussion

This section describes more specifically the key quantitative and qualitative data related to sense of community. *Refer to Section 4.1.2 and Table 4.1* for an outline of overall participation data, including participant roles and contributions. This section will also include discussion of possible conclusions as a result of the data collected. First, it will address the Sense of Community score and the findings associated with the Sense of Community score changes across time periods and the relationship to the overall participation data described in the first section. Second, it will describe themes that emerged

regarding participants' perspectives and feelings towards certain program and peer review-related factors when asked about their feeling of sense of community. Finally, it includes specific analysis that addresses participants who completed the entire sequence.

As demonstrated by the literature reviewed, peer review is generally accepted as a learning or assessment strategy. However, limited research has examined how peer review relates to sense of community or task outcomes for doctoral dissertation students. This study aimed to address the following research questions within the boundaries of the case being examined.

Research Question 1: What is the relationship between sense of community and peer review for doctoral dissertation students?

> **Hypothesis 1:** Sense of community increases as doctoral dissertation students complete more peer reviews.

> **Hypothesis 2:** Peer review contributions, such as annotations and number of words, are indicators of a relationship with participants' Sense of Community score.

Research Question 2: What program and peer review factors emerge as the constitutive elements of sense of community?

> **Hypothesis 3**: Both programmatic and peer review factors contribute to the level of sense of community

Overall, the data from this study demonstrated that there was a relationship between sense of community and the peer review experience. The qualitative data coupled with the quantitative data serves as a key contribution to this study and revealed factors that are relevant to the doctoral dissertation students of the present case when discussing sense of community.

4.3.1 Sense of Community

Sense of community serves as the theoretical foundation of this study. The aim of this research was to determine the relationship between sense of community and peer review. Both peer review and sense of community are defined in various ways. While the literature reviewed mentions definitions of sense of community, the present study aimed to understand participant's definition of sense of community prior to asking any additional questions during the focus group interviews. Participants shared several similar definitions with their own personal experience included. Key words and phrases included *belonging*, *support*, *small groups*, *we are all in this together*, *reciprocal*, *accountability*, and *someone to call when you are frustrated*. One participant shared the following personal experience as they attempted to define what sense of community means to them.

> "I've been a master's student on campus, and I would say the sense of community in this online doctoral program is overall better here than when I was on the campus. It's

stronger here. We are invested in each other's work. We know what people are going through. I appreciate the investment of ourselves into each other's work and lives. Reach out to people and say that I've got something going on and getting support from others. Community makes finishing important to everyone. That is what will set this program apart over time. The finish rate will be higher because people are giving encouragement along the way."

Sense of Community Score Calculation and Groups

While 108 surveys were included in this study, four were unusable in calculating the Sense of Community score due to incomplete responses. In addition to calculating the Sense of Community score for each time period, this study aimed to determine if there would be a change in the level of Sense of Community score during the present study's overall time period. Twenty-four surveys were unusable as a measurement in change of Sense of Community because the participant either did not complete multiple surveys completely or they only completed one survey. This excludes 23 participants from the Sense of Community change metric. Thirty-one participants have been included in the Sense of Community change metric. *Refer to Section 3.2.4 and Figure 3.4 for details on how Sense of Community scores were calculated and groups assigned.*

Each survey respondent was placed into one of three Sense of Community groups for each survey completed. All participants fell into the Medium (n=26) or High (n=25) Sense of Community group for their first survey. One possible explanation is the overall design of the doctoral program addressed in the present study. The regular courses within the program incorporate a peer review process, online peer communities, and weekly synchronous sessions with professors and peers where students share details on the individual updates they have contributed to the peer community or the works they have authored. By the time students arrive at the exam-dissertation sequence they are already acclimated to the peer-to-peer learning model and may have made connections with one or more peers and the advisors of the program. Using responses from participants' first survey, Figure 4.10 reflects the total number of courses (that leverage a similar peer review process) participants have taken prior to beginning the exam-dissertation sequence. On average, they complete four to six peer reviews per course.
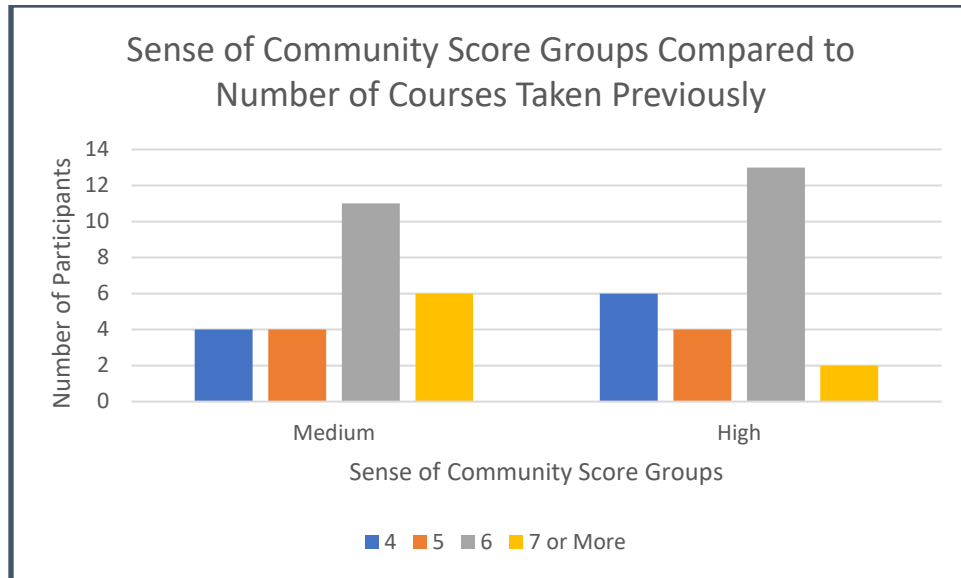
Figure 4.10 Sense of Community Score Compared to Number of peer review-based courses participants have previously taken

Sense of Community Score Groups by Time Period

Similar to the first survey for each participant, the majority of participants fell into the Medium and High Sense of Community groups across all surveys completed. Figure 4.11 places each survey respondent into their respective Sense of Community group for the four time periods within the present study. The number of participants in the Medium and High groups had some variance across time periods due to varying response rates to the survey across time periods. Eight of the fifteen participants who fell into the High Sense of Community group during the first time period did not complete the survey during the second time period. Additionally, time period three had a lower response rate overall, which may have contributed to the decrease in the number of participants falling into the Medium Sense of Community group.

Throughout the duration of this study, only one participant expressed a low sense of community. That participant experienced an increase in their sense of community group by the conclusion of the study. The change in Sense of Community score is discussed in the following section.
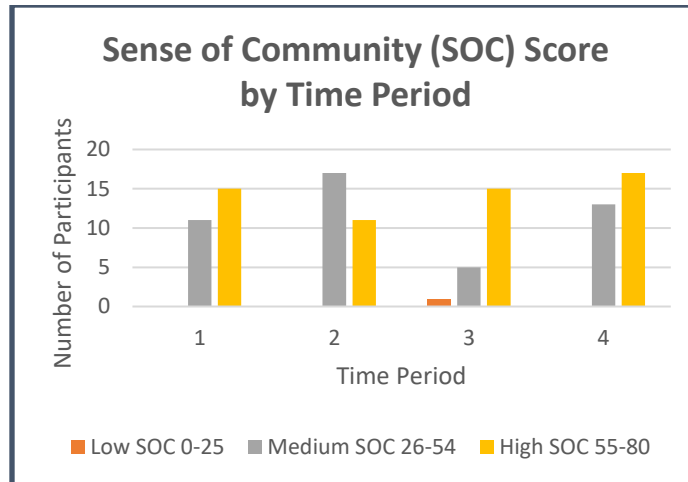
Figure 4.11 *Sense of Community Score Group by Time Period*

While only one participant was placed in the Low Sense of Community group, it is necessary to consider this as a part of the present case study. Assessing this participant's contributions, the participant did not submit any works during the third time period when the Low Sense of Community score was captured, however, this participant did complete four peer reviews with 65 annotations (average of 16.25 per review) and 1,715 words (average of 428 words per review). This participant had submitted one work during the second and fourth time period and had completed two reviews during each time period when this participant's Sense of Community score group was Medium. Considering the third time period for comparison purposes, this volume of reviews and the corresponding annotations and word counts were similar across twelve other participants who were at the same stage, but whose Sense of Community score group was Medium or High. Amongst these twelve participants, only three had submitted their own work, but seven had completed at least one peer review. This scenario represents that each participant had their own individual experiences and perceptions of what may have contributed to their sense of community other than peer review volume.

The qualitative responses in multiple survey questions by this particular participant explain the root cause more specifically. One comment relates to the theme of not feeling connected, while observing that others appear to feel connected. Another comment related to this participant's experience was the desire to review the same person's work as it progressed through each milestone in order to observe the changes made and impact of the reviewer's feedback. While an outlier as a Sense of Community score in the present study, the findings still carry weight when analyzed against other qualitative survey and focus group interview responses. These data are one demonstration that peer review participation alone cannot be used to explain the reason for a participant's particular Sense of Community score. Other factors may

include length of time within a specific stage, number of students at the same stage, the types of works being reviewed, and more.

During the third time period, additional questions were added to the Exam-Dissertation Sequence survey. This particular participant commenced the sequence during the second time period and remained at this stage for the duration of the study. The third and fourth surveys include a new question regarding exam-dissertation sequence goals. The participant who fell into the Low Sense of Community group during the third time period reported in both the third and fourth surveys that their exam-dissertation goals were not being met. Figure 4.12 compares two elements of the Exam-Dissertation Sequence survey: Sense of Community group and if the participant's exam-dissertation goals are being met. The survey also asked students to share what they felt was contributing to their goal status. This participant shared that they felt the requirements were vague, while the majority of participants who stated they were not meeting their goals reported factors associated with their own circumstances, such as family and work obligations or the COVID-19 pandemic getting in the way of their progress.
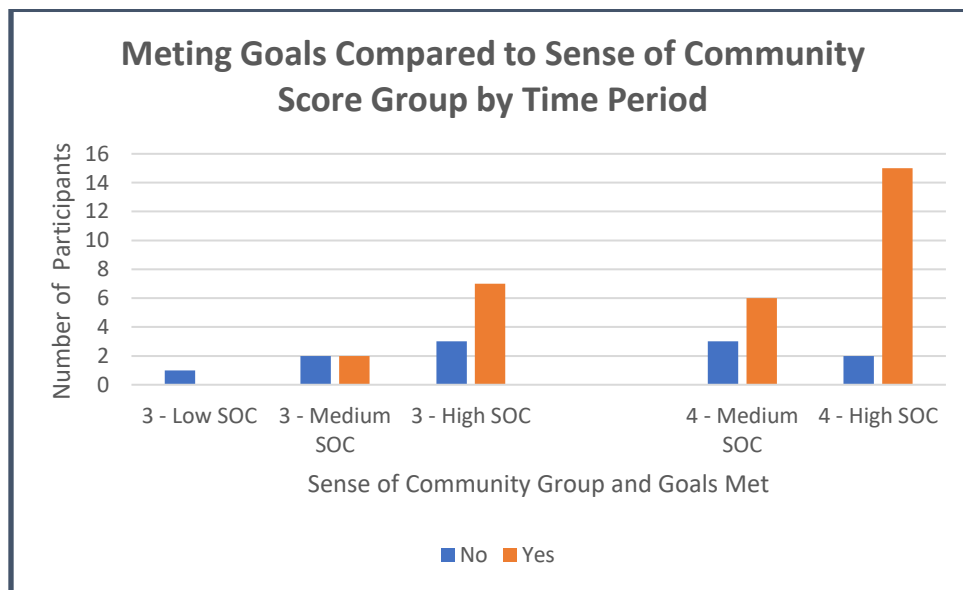
Figure 4.12 Sense of Community score group compared to Goals being met during the third and fourth time periods

Referring to Figure 4.12, a greater percentage of participants with a higher Sense of Community score tended to self-report that their goals were being met. Seven out of ten (70%) participants and fifteen out of seventeen (88.2%) participants who fell into the High Sense of Community group reported meeting their goals during the third and fourth time periods, respectively. This data alone cannot indicate a specific relationship with the peer review experience. However, considering the design of the present study's doctoral program, the scaffolded, self-paced, peer-to-peer learning and advisor-supported

pedagogy coupled with individual circumstances and motivation may influence one's sense of community and whether or not their dissertation goals are being met. The quantitative and qualitative data demonstrate that the program pedagogy enables, but does not guarantee, a high sense of community. Additional research should be conducted to examine the relationship between these variables more thoroughly.

Sense of Community Scores Compared to Participation

By the conclusion of this study, Figure 4.13 provides a comparison of the final Sense of Community score to the total number of peer reviews completed throughout the present study's time period, not simply those during the final time period. Zero scores represent peer reviews that were completed by participants who did not submit a survey for the fourth time period.

The variance of these two data points demonstrates a general trend of higher sense of community for those with a higher number of reviews, with some outliers, such as the participant who had submitted six peer reviews who had a similar Sense of Community score to a participant who only submitted two peer reviews. Conversely, some participants with higher Sense of Community scores had not submitted any or only one or two peer reviews. This data speaks to the subjectivity of participants' reasons for feeling a certain level of sense of community. It is proposed that other factors, such as reviewing a work similar to their own or the length of the work, as discussed later, have contributed to this variance and should be considered as a part of this analysis. These factors are discussed in the *Section 4.3.3*.
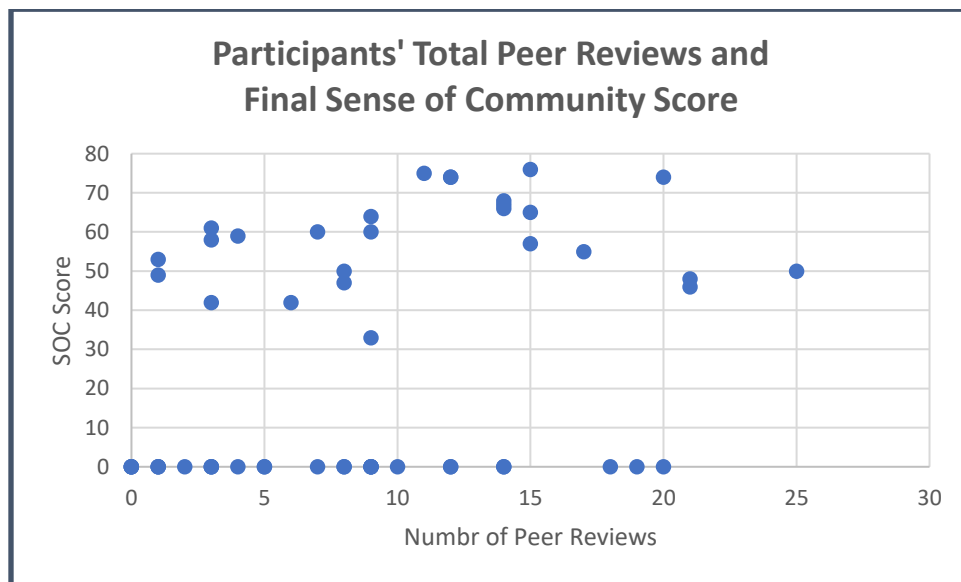

Figure 4.13 Comparison of Final Sense of Community Score to Number of Reviews at the End of the Study

The present study hypothesized that sense of community would increase as the number of reviews increased. Overall, the present study found that the variables of peer review quantity and Sense of Community score were independent. The data reflect that completing more peer reviews does not directly impact participants' Sense of Community score. Hypothesis number one is therefore rejected. The data found that a medium or high level of Sense of Community was developed early on and was maintained throughout the duration of this study. The factors that may have contributed to this are outlined in *Section 4.3.3*. One possible conclusion is that students complete peer reviews primarily out of obligation, but completing them does not decrease their sense of community because they have a desire to support their peers and/or they gain something themselves as a result of the peer review. Some focus group and survey participants reported that they find value in reading others' work even if they do not feel that their peer review contributions are that helpful. To further support this conclusion, 45 out of the 51 survey participants who responded to this question on their final survey (88.2%) reported that they agree or strongly agree with the following question: "I have found my role as a Peer Reviewer to help me improve my own work." Conversely, as authors participating in the peer review process, 45 out of the 53 (86.5%) survey participants responded in their final survey that they agree or strongly agree that "I feel that my final versions are of higher quality as a result of the peer review feedback that I receive." The remaining seven participants reported a neutral response. These data further support the conclusion that peer review completion volume is not the only contributing factor, but rather the overall peer review process.

In addition to the benefits of participating in the peer review process, the data from the present study demonstrate that the nature of participating in the peer review process maintains or preserves participants' level of sense of community. Examining individual questions from the exam-sequence survey helps to confirm this finding. In addition to the survey questions that contribute to the Sense of Community score, several targeted questions were asked (*refer to Appendix A for a list of survey questions*). By the conclusion of the study, 82.7% of (24 out of 29) survey participants responded with Strongly agree or Agree to the question: "I experience a sense of community as a result of the peer review process". The remaining five participants responded "Neutral". Questions from the Sense of Community score calculation such as "I do not feel a spirit of community participating in the EDS", indicate similar findings. Only two out of 21 participants reported that they agree with this negatively-written statement.
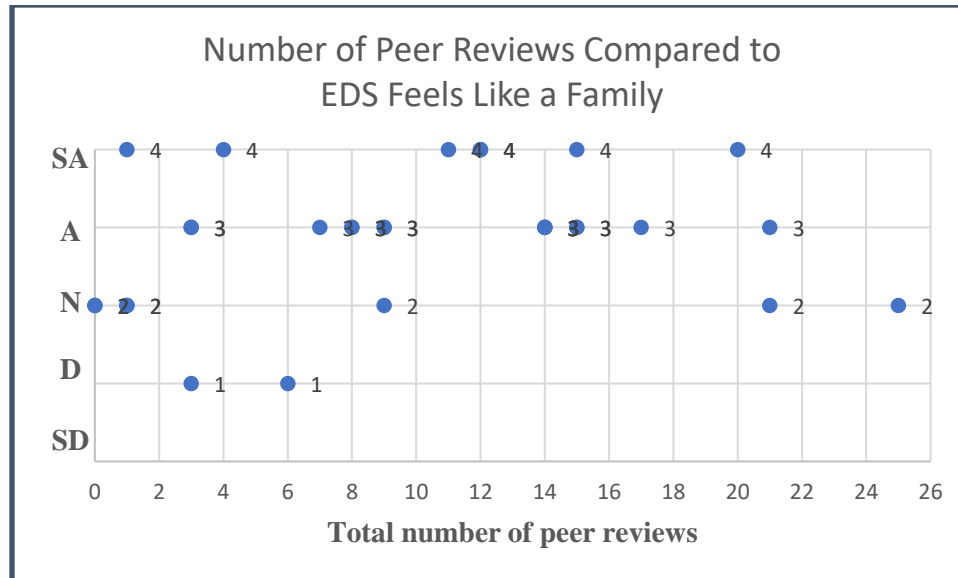
Figure 4.14 *Total number of peer reviews completed compared to Survey Question #5.5*

While the relationship to the number of peer reviews may be independent, the majority of survey participants reported that they feel a spirit of community while participating in the overall exam-dissertation sequence. Specifically, out all of all 52 survey respondents, 32 responded in their final survey that they disagreed or strongly disagreed when responding to the following question "I do not feel a spirit of community participating in the EDS". Eleven participants provided a neutral response. Similarly, 39 survey participants reported they agree or strongly agree that "I feel that engaging with my peers in the EDS is like a family". Nine participants responded neutrally while four responded either disagree or strongly disagree. These two questions contribute to participants' Sense of Community score.

One element of the peer review process is to provide ratings and comments aligned with a rubric. Additionally, reviewers are encouraged to provide annotations in order to connect with both the content of the work and the author. The length of the review itself and the annotations as contributions demonstrate a level of engagement and peer-to-peer support. Figure 4.15 illustrates the average number of words per peer review and Figure 4.16 represents the number of annotations, each relative to participants' Sense of Community score at the conclusion of the study. As participants moved between Medium and High Sense of Community groups, there was no significant change in the number of annotations in their reviews. Conversely, participants who provided a greater number of annotations did not experience a significant increase in their Sense of Community score. Additionally, elaborating on their ratings through comments has not changed over time.
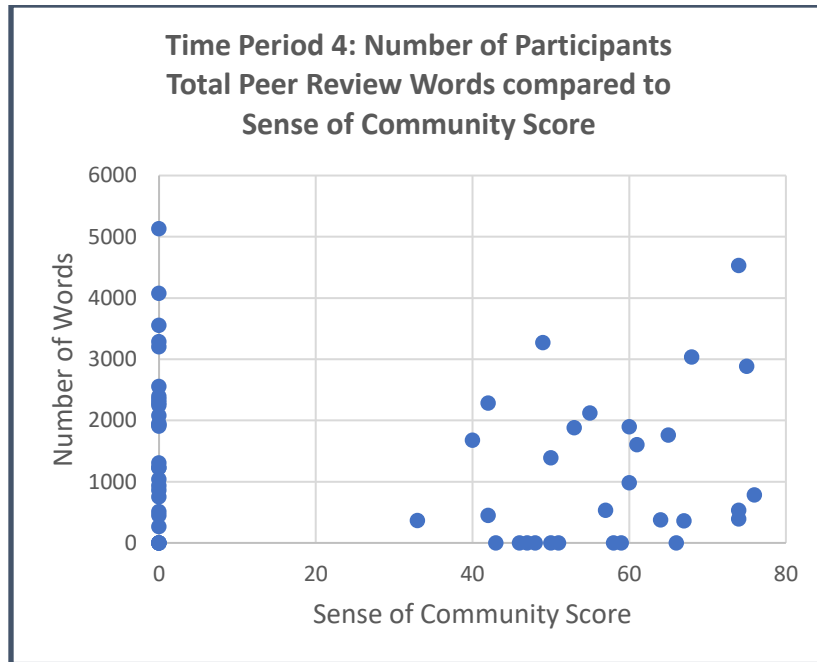
Figure 4.15 Number of Peer Review Words across all reviews compared to Sense of Community Score during Time Period 4
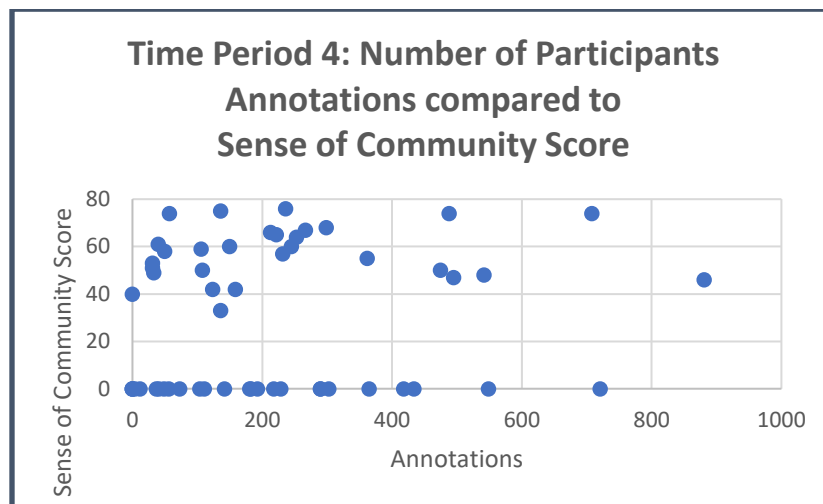
Figure 4.16 Number of Annotations compared to Sense of Community Score in Time Period 4

Similar to hypothesis one, which was associated with the peer review volume, the second hypothesis of this study was that the number of annotations or peer review words were related to sense of community. This hypothesis is also rejected. These comparisons do not conclusively demonstrate that the number of annotations or the number of words in the peer review correlate with sense of community. However, data from the focus group interviews and survey responses provide evidence of participants' perceptions of the review rubric (ratings and comments) and the annotation feature. This study revealed a

benefit of the annotation element of the peer review process. Forty-nine survey participants (94.2%) reported in their final survey that they agree or strongly agree that, "I am able to take action on the annotations provided by my peer reviewers". Two responded neutral while one participant disagreed with this statement. The concept of annotations is discussed again later in this chapter.

Sense of Community Score and Group Change

Figure 4.17 speaks to respondents' first and final Sense of Community score. All participants who completed at least one survey are included in the First Survey metric. Only the 31 participants who completed at least two surveys were included in the Final Survey metric. Surveys may have been completed during any of the four time periods and participants may have completed more than two surveys during the duration of this study. There were no Low Sense of Community scores reported during the first or final survey, however, as stated previously, one participant who completed all four surveys fell into the low sense of community group during the third of four surveys. By the conclusion of the study, there was an increase in the number of students who fell into the High Sense of Community group, while the number of students in the Medium Sense of Community group remained similar to the number from the first survey. Sense of Community scores from participants' first and final surveys were used to calculate the change in Sense of Community score group as outlined below.
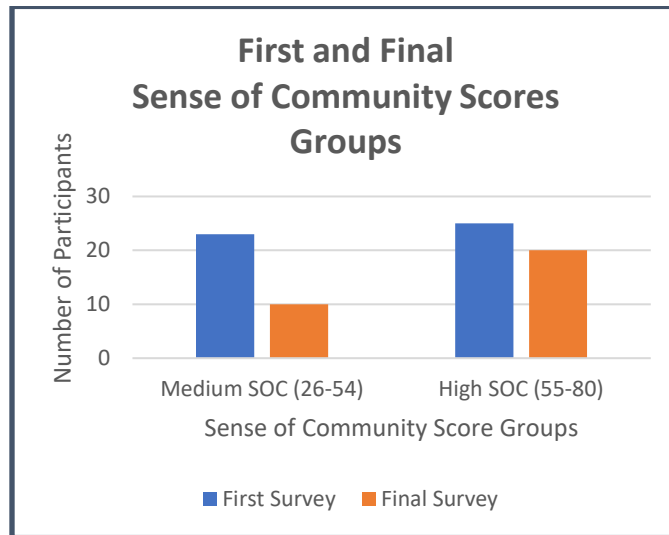
Figure 4.17 Participants' First and Final Survey: Sense of Community Score (regardless of time period)

Considering the 31 surveys that were eligible for the Sense of Community score change metric, the Figure 4.18 demonstrates how many participants had an increase or decrease between their first and final survey, both within the Low/Medium/High group designation and for their specific score. While 21 participants had no change in their Sense of Community group designation, every participant experienced

a change in their actual score. Thirteen participants experienced a decrease in their score and 18 experienced an increase. The largest decrease was 12 points while the largest increase was 26 points. The smallest decrease change was 1 point and the smallest increase change was 2 points. These data coupled with the previously-reported data reveal that overall participation in this doctoral program enables maintaining a medium or high level of sense of community, but does not specifically demonstrate a relationship to the peer review process.
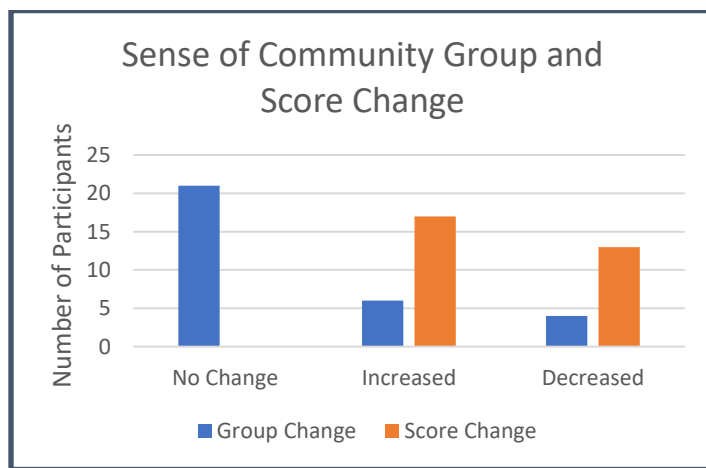
Figure 4.18 Participants' Sense of Community Score Change

While 21 participants experienced no change in their Sense of Community group designation, two participants who completed at least three surveys experienced a change in the middle, but ultimately had no change by the time of their final survey. One possible explanation for this finding is that the survey is captured at one specific point in time. Students progress through the sequence at varying paces, may have recently reviewed a work that was challenging or unrelated to their topic or stage, or the participant may or may not be meeting their own exam-dissertation goals at the time of completing the survey. One participant experienced a decrease and then an increase, which was already noted previously, and the other participant experienced an increase and then a decrease. This particular participant had completed the entire exam-dissertation sequence at the time of completing the final survey. One explanation for their decrease was due to their experience during the final stages of their dissertation. Additional research should be conducted that specifically examines those who have completed the full sequence.

Self-Reported Sense of Community Change

Partway through the study and after preliminary analysis of the first two surveys and the focus group interview data, four questions were added to the Exam-Dissertation Sequence survey. Two mentioned previously related to exam-dissertation sequence goals being met. Another new question was:

"Have you felt an increase in feeling a sense of community since you began the exam-dissertation sequence?" This self-reported data point serves as a potential validation of the Sense of Community score that is calculated from the response to the 20 other questions. A possible risk for comparing these two values is that the self-reported question refers to Yes/No. For analysis purposes, "Yes" was considered an increase while "No" was tagged as a decrease. It is important to note that participants who responded no were not necessarily stating that they experienced a decrease in sense of community. A follow-up question was added that asked participants to explain what they felt contributed to their change in sense of community, whether an increase or decrease. One specific survey respondent stated, "I actually feel more isolated since starting the exam sequence. Most likely because I don't feel the need or have the requirement to attend class each week. I wouldn't say I feel any less connected, just no increase feeling of a community." Another survey respondent said, "I feel about the same as I did when I started. I do not feel any increase, but don't feel a decrease either." It should be considered that future programmatic surveys should include a revised question to ask more explicitly whether the student has experienced an increase, decrease, or no change in their sense of community.

Figure 4.19 aggregates data from the third or fourth time period for each participant, whichever one was completed last, and captures participants' change in the calculated Sense of Community score (SOC) and the self-reported sense of community change. If a participant responded to both the third and fourth survey, only their response from the fourth survey is reflected in this measurement. While 31 participants were included in the Sense of Community Score change metric, six of those participants either did not respond to the third or fourth surveys (but instead responded only to the first and second surveys) or they had just begun the Exam-Dissertation Sequence and responded with N/A. This leaves 25 participants to compare their calculated and self-reported sense of community change. Overall, these two data points confirmed that the peer review process itself is only one element of their overall experience and sense of community and that other factors contribute to participants' sense of community.
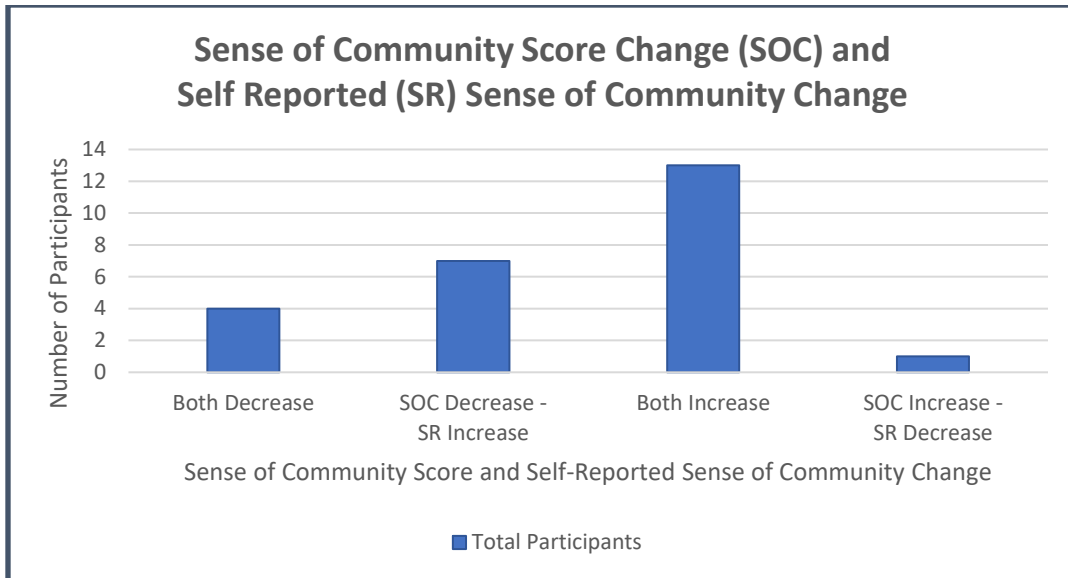
Figure 4.19 *Sense of Community Score Change and Self-Reported Change Comparison*

Some possible explanations for students experiencing a decrease in sense of community may be due to the student not actively making progress on their work, working independently or focused on their own work or not receiving helpful peer reviews.

The Sense of Community Score instrument coupled with peer review data demonstrated that the peer review process may have led to high levels of community engagement through peer review contributions (for example, annotations and review comments) and authors' self-reviews and percent change in their work product. The evidence shows through the four time periods that the medium and high sense of community groups persist, with only four of the eligible participants experiencing a decrease in their Sense of Community group. This instrument serves as a helpful pulse-check on students' self-reported sense of community at a given point in the process. However, it is through discussion of specific program and peer review factors that the one can more fully assess the influence or relationship with peer review and sense of community. The next section seeks to expound on the factors that emerged in response to the qualitative survey and focus group interview questions.

4.3.2 Program and Peer Review Factors

As stated previously, in addition to the general self-reported change in sense of community, survey participants were asked to describe what they feel contributed to their change (either increase or decrease) in feeling or not feeling a sense of community. Thirty-seven participants responded to this question across the third and fourth surveys. A similar question was posed during the focus group interviews. Related responses emerged throughout the focus group interviews and through additional open-ended survey questions. Each of these has been incorporated into the findings within this section.

These qualitative accounts are not intended to serve as generalizations, but rather to describe the sentiments of the participants of the present case that may provide context and a demonstration of participants' sense of community, as conveyed in the previous section. Several themes emerged and serve as the discussion for the remainder of the present study.

General Observations

The present study revealed consistent responses across participants regardless of their sense of community level or whether or not they felt they have had an increase in sense of community. Participants who had responded that they had not felt an increase in sense of community had similar responses, but had individually experienced the opposite effect compared to those who responded affirmatively. For example, someone who responded with "No", did not feel that they were receiving feedback in a timely manner, while those who responded that they had experienced an increase reported timeliness as a favorable reason. The data demonstrates in this scenario that for some participants, timely feedback influences sense of community. Alternatively, two respondents shared that they reached out to peers outside of the structured processes as they felt a greater sense of community, while a respondent who said "No" shared that they felt that they did not need the community and that they could complete this process on their own. These responses confirm a critical variable reported previously that each student has his or her own perceptions and circumstances that will contribute to their feeling a sense of community, regardless of the structure or support that may be in place. It is necessary to consider this variable in relation to the summary of qualitative data that follows.

Program Structure and Advisor Support

Advisors held multiple synchronous group advising sessions each week and offered individual sessions when requested. A teaching assistant was hired to support students and advisors in 2019 after the initial group of students had begun the exam-dissertation sequence. A variety of resources were created or curated as needs were identified to assist students with content and process-related questions. Overall, both focus group and survey participants reported that advisor support through the synchronous advising sessions, the responsiveness of the teaching assistant, and access to relevant resources all contributed to their sense of community.

Attendance at the optional weekly synchronous advising sessions typically varied, but increased throughout the duration of the study as more participants began the exam-dissertation sequence. This data point was not tracked during this study, but will become a program-related tracking item effective January 2021 as a result of this study. Five recorded sessions were reviewed from October and November 2020 and observed an average of 15-20 students in attendance each week. This is about a 30% attendance rate.

Most participants reported that the larger community was favorable and contributed to their feeling a sense of community. Four of the participants who participated for the full duration of this study stated that early in their progress the community was small and they found it difficult to feel a sense of community and that the larger group facilitated an increase in their sense of community. However, one survey respondent voiced a concern that the synchronous advising session group was getting too large and therefore, this participant felt intimidated to present.

Survey and focus group participants shared additional feedback that demonstrates the value of the peers attending the synchronous group advising sessions. Common themes included motivation, getting to know peers' topics, and ultimately connecting with others.

One survey respondent shared, "I feel more motivated to peer review works for those I see in the synchronous dissertation session. It is hard for me to connect with one's work if I do not know the peer and have not heard them speak on it." Another respondent shared a similar sentiment after learning that the sessions will soon be required, "I think it is helpful that advising sessions will be mandatory. I think it is helpful when you are able to hear the writer explain their work especially if it is a different field than your own." Another supporting example from a survey respondent says, "synchronous sessions in the dissertation each week; seeing people talk about their work, their journey, really helps me especially if I am not necessarily in their field, just hearing their background helps."

A focus group participant shared that lack of attendance on the weekly sessions was a hindrance for them. "…I don't get to see their face or get to know them on a class level." In conjunction with attendance, multiple respondents in both the focus group interview and from the surveys shared that video during the synchronous sessions can increase their sense of community. Specifically, one respondent stated that "cameras off can stymie sense of belonging."

While connections can be made through the peer review process and peer community, participants responded that the synchronous sessions enable them to connect with someone they maybe had not worked with previously. For example, one participant said, "in one session I met another student and now we text each week; our goals, etc. She has had a harder time starting, but we can give each other prompts to motivate one another. Accountability buddy. Open reviews and seeing what others are doing and reviewing their work and going back to their updates, I like how open it is."

Peer Review Process: Rubrics

Students were expected to respond to a rubric when completing peer reviews. The peer review rubrics used as a part of the exam-dissertation sequence varied for each type of project (Annotated Bibliography, Literature Review, etc.). However, they all deployed a similar design and rating scale. Rubrics were a topic of discussion in response to multiple focus group questions, even when the question itself did not intend to address rubrics. Responses from study participants were related to both the rubric

questions and the rating. While the majority of focus group participants agreed that a rubric was helpful and necessary, the consensus amongst the focus group participants indicated constraints on their freedom to accurately provide peer review ratings. They specifically reported that the ratings on the rubric negatively influenced their sense of community.

This became a lengthy discussion that ultimately resulted in a programmatic change. One example from this dialogue includes,

> "I don't like the numbers either; I always labor over what number to give someone; if I give a lower number, I always think about how they are going to receive this, I'm going by the rubric, I can tell they put effort, but it isn't right there, but then I get focused on the number. Then people comment back to me about the number. What does the number even matter? It is more a distraction."

Another participant provided an additional insight, "ratings are particularly not helpful to building sense of community; as a peer I want to offer suggestions, if they are valid; they can take them. Or maybe I am uninformed, and you can ignore them. But as soon as I assign a rating, it sets a different tone. And the reaction is negative, even if the intention was positive."

The rubrics were revised halfway through the present study to be a three-point scale (requirement not met, needs improvement, and only minor modifications needed). While the rubric topic was discussed during the first focus group and the first two surveys, it did not emerge during the final two surveys. These findings and the timing of such comments suggest that the rubric rating in particular may influence the peer review experience and one's sense of community.

Participant Stage in the Sequence

Both survey and focus group interview participants touched on the theme of amount of peer review experience. Through written responses and visual cues during the focus group interviews, there appeared to be collective acknowledgement that peer review training and experience were critical to a reviewer's success. As reviewers, focus group and survey participants conveyed that those who were just starting out felt overwhelmed and did not always feel comfortable or felt that their review would not be valuable to the author. The majority of survey respondents and focus group participants suggested that more training on the types of works being reviewed needs to be done at the beginning of the exam-dissertation sequence, especially prior to conducting their first peer review. Authors further along in the sequence did not always have confidence in reviewers who may have been less experienced in the process. Some participants expressed concerns that some peer reviewers have not had any experience in the process yet and feel that the review is of less worth. For example, a participant stated, "[They] are simply in over their heads and guessing. Those are pointless reviews (and are irritating at times when they are telling you to change things that they clearly don't understand)". However, some participants

acknowledged that if the topic was similar, the stage was less of a concern. One participant shared that even if they cannot comment on the requirements, the reviewer could comment on the content.

Overall, the focus group and survey data showed that participants perceive that experience with peer review can influence sense of community, but that being connected to the topic itself has greater weight. Reviewing works of a similar topic is discussed in more detail later in this section.

Peer Review Process: Open Peer Review

The Exam-Dissertation Sequence survey asked two questions associated with the open peer review process, which refers to authors and reviewers knowing who the other person is. Similarly, a topic that was raised by more than one focus group participant that is worthy of further research is the concept of peer review compared to peer support and how each of these influences the dissertation outcomes. One participant said, "peer review is something different [than a peer support community] and should be more professional and honest. I did feel that I have to hold myself back so as not to hurt the feelings of a colleague of mine". At least five focus group participants seconded this comment and struggled to reconcile their own analysis of the open peer review process. While they agreed that they prefer to have the process be open, they also expressed the same concern as the participant referred to previously. At least six focus group and survey participants also indicated that the open peer review process increased their sense of community.

Table 4.4 shows the fourth time period's survey responses when asked "I feel that knowing my reviewers and/or authors influences my sense of community" and "I feel that if I know whose work I am reviewing, I would be comfortable being completely honest in my review".

Survey Question Fourth Time Period Responses	I feel that knowing my reviewers and/or authors influences my sense of community (Q6.2)	I feel that if I know whose work I am reviewing, I would be comfortable being completely honest in my review (Q6.8)
Strongly Agree	11	4
Agree	11	9
Neutral	4	9
Disagree	4	7
Strongly Disagree	0	1
Participant Skipped	1	

Table 4.4 Survey Responses to Question #s 6.2 and 6.8

A programmatic suggestion emerged from this discussion during the June 2020 focus group interview. Similar suggestions were shared in the Exam-Dissertation Sequence survey during the fourth time period. The suggestion was to have more real-time peer-to-peer feedback sessions. One participant shared, "I really wish we could have a conversation about the work rather than doing the annotations

asynchronously. I feel a lot of time and energy could be saved if we could ask questions of the author in real time. This would help build a sense of community as well as improve the works themselves. I know people often answer the annotation comments one by one, but those are really one-way conversations." As a part of the program requirements, during the month of November, nine students were preparing for their final defense and first presented to a voluntary group of their peers. Feedback in the final survey and during the final focus group interview reflected positive outcomes of the peer presentations.

The survey and focus group data generally convey that knowing the reviewers influenced sense of community and also enabled additional interactions that also contributed to sense of community. This open peer review approach differs from the regular program courses, which deploy an anonymous peer review process.

Peer Review Technical Platform

While real-time feedback may be advantageous in some situations, it is not always practical nor feasible, especially given time zone differences and that fact that most students are employed full-time. The asynchronous peer review process aligns with the seven affordances of the New Learning theory (Kalantzis & Cope, 2012). While responding to what impedes sense of community during the focus group interview, response themes turned to a discussion of the peer review platform, specifically the annotation feature. Some students conveyed that the platform may have influenced their peer review contributions. For example, a technical restriction makes it difficult to see long lists of annotations. Terms such as *annoyed* and *frustrating* were used when describing the annotation viewing feature. One participant admitted that they purposely do not give very many annotations because of this usability issue. There was a consensus that a scroll bar on the annotations viewing screen would increase their satisfaction with the tool and possibly increase their number of annotations. Another participant agreed, "annotation is hard because I get annoyed with the formatting in CGScholar. Once I can't find it, I'm over it. The tech side annoys me." The literature reviewed confirms that the technology platform can influence the peer review experience and ultimately the outcomes. In reviewing the volume of annotations across the duration of this study, it appears that some participants consistently recorded very few annotations, while others followed a common trend with other participants. Some participants stated they prefer to provide their comments on the rubric form, while others stated that the annotations allow them to be more specific and they have not found the rubric to be as useful. This data confirms the importance of the annotation feature, but that it may be used differently by each student and that it cannot be used as a predictor for the level of sense of community, as stated previously.

Participants and the Peer Review Assignments

The peer review assignments themselves emerged from the survey and focus group data as one of the more important factors when discussing sense of community. This addresses the present study's research questions by conveying a way in which peer review and sense of community are related. Additionally, it confirms the findings of the present study stated earlier that the quantity of peer reviews completed is not a dependent variable when assessing a student's sense of community.

As stated previously, students submit milestone deliverables towards their final dissertation throughout the exam-dissertation sequence and are typically assigned three peer reviewers. These assignments are made manually by the graduate assistant based on a few factors. Peer review assignment methodology considerations:

- Similar topics
- Similar stage
- Advanced stage
- Consistent author/reviewer combination across works

These factors were not always feasible during the study time period. For example, early in the present study, the number of participants was low, so it was not always possible to match someone based on related topics. Similarly, it was not possible to assign a more experienced reviewer because the initial group of students were all starting out at the same stage.

Focus group participants had varying replies regarding the peer reviews themselves. Common words used included *time consuming*, *hesitant*, and *confidence*. These themes centered around being familiar with the research subject and understanding the process and work requirements. As stated previously, the concept of similar topics overlaps across multiple themes.

Time Commitment, Similar Topics, Stage, and Partnerships

Consensus across most survey respondents and focus group participants was that there was not enough time to provide quality reviews. Several participant comments represent the findings. For example, one participant shared that it is usually time consuming because, "I don't always understand what the author is writing about… and because I am trying to be helpful." However, participants in the focus group interviews shared that if they were reviewing works related to their own research topic, it would have made it not feel as time consuming. One participant shared that when reviewing a work similar to their topic, "[it] also provided me with refreshing points of view." Participants also explained that they feel less confident in providing feedback when they are unfamiliar with the topic. The consensus was that if they had to choose between reviewing a similar topic or reviewing a work type that they had already completed themselves, they would choose to review a work on a similar topic. To

demonstrate this theme, a participant from the final focus group interview who had recently defended their own thesis said, "I felt incompetent [as a reviewer] if I didn't know the field." In contrast, another recent graduate shared their candid feeling that "originally it was hard to match people because there were so few people; as I made through it, some hadn't done the general, but were reviewing several steps further on. That was evident that they were doing their level best to give important feedback; but if you haven't been through the process, there is nothing like going through it and giving proper advice to others."

Universally, focus group interview participants agreed that the peer review process is only meaningful to them if the reviewer takes the time to "assess and offer a critical and thoughtful analysis", as one participant stated. While some participants felt that the quality of reviews has increased within the exam-dissertation sequence, there was not a consensus represented in the survey results. Some participants still felt that they receive mediocre reviews. One participant shared a recommendation to potential minimize this concern. "Asking questions within my "Note to Reviewers" helped direct their feedback to the sections/question that I wanted help with or answered."

For the purpose of the present case study and the types of works being created in the exam-dissertation sequence, the factor of reviewing ongoing iterations of a peer's work was revealed as one of the most important due to the time commitment involved in understanding someone's work, especially as the length of the work increases. Participants also reported that they feel an increase in sense of community when they see how their feedback has been applied as well as seeing the progress of their peers. This also influences feeling a sense of community by collaborating with someone who may be experiencing similar challenges or working towards the same milestones. A few participants shared that this partnership can also lead to collaboration outside of the formal peer review process, such as writing sessions or text check-ins.

Participants did not completely discount the value of reviews they give for dissimilar topics when reviewing a work for someone who is further along in the process. One survey participant explained it this way, "Not a lot of us working on the dissertation, helpful to see someone else's work even if I don't know about the topic. I can't make substantive contributions. I get something out of it, but I'm not sure if I am as helpful to them, though." Another participant shared "[a] variety of different types of reviews have been beneficial, some are grammar and formatting, while others are focused on big ideas, theories being explored; that has helped with the quality of the process; looking at others' work has given me ideas and inspiration."

As the exam-dissertation sequence is a series of iterative deliverables, some reviewers were assigned as repeat reviewers. Results from this study found that reviewers feel a sense of community when they observe the progress made by their peers. One participant shared a personal experience, "peer

review contributes to the community we are building. I was reflecting on…the intimacy that we have now with the peer review process, we get to see people's work, thinking, ideas, and we get to see it solidified, the accountability, and ultimately it gives me a sense of community as I'm invested in myself, but also multiple people and their success." However, another survey respondent shared a sense of discouragement when an author had submitted their next iteration so quickly after the previous one. "...I get a notice that someone already finished their Literature review. How did he do it so fast?? You get out what you put in." Similarly, both survey respondents and focus group participants also expressed concern with the time it takes to review longer works when they have not previously reviewed them.

Survey respondents generally reported that the number of reviews may be too high, especially for certain milestones or based on their desire to work on their own work. The focus group interviews for those graduating in December 2020 reported that it would have been a better experience if two people were assigned to work together on their final dissertation drafts rather than trying to fulfill the three peer reviews per work requirement.

Summary

Overall, the survey and focus group data reflected the importance of the peer review assignment methodology including matching students with similar topics in addition to considering the milestones that the reviewer has already completed. The data also demonstrated allowing sufficient time to complete the review, and timing the reviews in a way that it does not interfere with their own work was important to the participants, even if not specifically contributing to their sense of community. However, a subset of survey respondents indicated that when reviewing the same person's work multiple times, they not only felt a greater sense of community, but they felt that the time commitment was more reasonable.

4.4 Participants who Completed the Entire Exam-Dissertation Sequence Process

This section includes a narrative regarding a subset of participants from this study who graduated in December 2020. This subset within the overall study was not an expected inclusion at the start of this study. Around August 2020 it became evident that at least a few students would graduate in December 2020. In the end, nine students graduated before the conclusion of this study. A special focus group interview was scheduled for this group of students. Five of the nine graduates attended an optional program-exit focus group interview after their final thesis deposit date. Six of the nine graduates were included in the Sense of Community score change metric. A different set of six of the nine graduates completed the final exam-sequence survey. Their comments in particular provide a different level of insight into the topics and themes associated with the present research study. As students who have gone through the entire process, they can inform the research questions in a different way. While a separate

survey was not created for this audience, the focus group interview questions were very specific to their stage in the sequence. *Refer to Appendix B for a list of focus group interview questions*.

Sense of Community Score

There were a few notable data points that separated some of the graduates from the rest of the present study's population. Three of the four participants who experienced a decrease in Sense of Community score groups from the overall study population had completed the full exam-dissertation sequence at the conclusion of the study. However, two of the three who experienced a decrease in Sense of Community scores self-reported an increase in sense of community on the survey during the fourth time period. Further investigation is necessary to evaluate the Sense of Community score methodology against the self-reported sense of community change.

Out of the remaining six graduates, one had a 26-point increase moving them from a Medium to High sense of community group, another with a 10-point increase, but keeping them in the same group, and one had a three-point decrease, also keeping them within the same Sense of Community group. One possible explanation for this variance is a participant's disposition at the time of completing the surveys or the solitary nature of the data collection process. Three other participants who completed the entire Exam-Dissertation Sequence did not complete more than one survey and were not included in the Sense of Community comparison metrics.

Program and Peer Review Factors

During the focus group interview, several topics were raised that align with the findings from the overall population. However, this particular group of participants had a unique perspective due to their longevity in the program. Three participants reported that the infancy of the Doctor of Education program initially impeded their sense of community, but it improved over time as more participants entered the sequence, after a teaching assistant was formally hired, and also as more resources and examples became available. They all expressed consensus that it was due to a sense of community and because of the peer support network that they were able to persevere and complete their final dissertation. This finding contradicts the Sense of Community score for some participants at the conclusion of the study, but aligns with the self-reported sense of community increase.

Similar to the overall study population, this subgroup agreed that the open peer review process enhanced their sense of community and their sense of responsibility. However, there was also unanimity among the five focus group participants that not all reviews were of equal quality. One participant stated, "I enjoyed all of the reviews. Even the bad ones were helpful in some ways. Sometimes I would get contradictory advice for APA. I bought the book so that I could know for myself what was right."

Similar to findings from the overall participant data from the present study, a concern was raised that the quantity of reviews was difficult, especially at the end. Participants hypothesized whether fewer reviews might lead to higher quality. They acknowledged that especially at the end they should only be reviewing one full dissertation at a time. However, they also reported that reviews improved as their volume of reviews increased. Additionally, they acknowledged that as the program developed, a culture of quality reviews was established.

Ultimately, the five focus group participants unanimously confirmed that the advisor support at the very end was more critical to them and they would have liked to have received advisor feedback at this final stage prior to receiving the peer reviews. The exam-dissertation sequence had a structured process to encourage students to bring their questions and sample work to the synchronous advising sessions and route their work for peer review prior to receiving a formal advisor review. However, students were invited to meet with their advisor individually at any time. Focus group participants reported that early in the sequence they were not seeking advisor feedback prior to the peer review step in the process, which created anxiety, but not necessarily a lack of sense of community nor a lack of advisor support. They each concurred that peer reviews near the final stages of the dissertation are less valuable and more difficult. One participant said it plainly, "Nobody is going to actually change anything at this point". Another participant echoed a similar sentiment. "I didn't make very many substantive comments. What is the point if I asked them about their research question? I didn't want to put their research at risk. So, I said less than I wanted to." However, participants did agree that the pre-final defense peer presentation elevated their sense of community. For example, one participant said, "seeing my peers there really made me feel supported."

The present study's findings demonstrate that the peer review process was a valuable element as a part of the doctoral dissertation experience for students who had completed the entire process, however, the purpose of the peer review at each step played an important role. The present study also found that additional factors were critical to their success. such as ongoing advisor support and establishing collaborative partnerships with peers,

CHAPTER 5: IMPLICATIONS, FURTHER RESEARCH, AND CONCLUSION

The present study examined the relationship between sense of community and peer review experiences of a specific group of doctoral dissertation students. It added to existing research on both sense of community and peer review design by looking at these students' peer review contributions, Sense of Community Score, and perceptions on the value of the peer review process. It also provided a longitudinal perspective instead of at a single point in time. The present study also revealed program and student factors participants consider relevant to their sense of community.

The present study attempted to demonstrate perceptions for this specific group of students. While the literature reviewed mainly considered a peer review exercise within a specific class, little existing literature considered the ongoing peer review experience for students over a series of courses or deliverables. Additionally, these studies associated with peer review did not examine the relationship to sense of community. While peer review has been researched in a variety of capacities and disciplines, the literature continues to lack emphasis on doctoral dissertation students, especially those in a peer-to-peer learning model such as addressed in the present study, which does not follow the traditional doctoral program approach.

The present study demonstrated that peer review quantity and the corresponding contributions alone can not determine or influence someone's sense of community; however, it did illustrate that the act of participation is a contributing factor and enables students to maintain their medium or high level of sense of community. Additionally, specific elements of the peer review process carry a greater weight in a students' sense of community compared to the volume of peer reviews. And ultimately, there are individual student circumstances and perspectives that will influence both the peer review outcomes and the level of sense of community.

Aligned with the findings of the present study, this section will present recommendations that may be applied specifically to the program addressed in the present study or considered more broadly for more traditional doctoral program models. Next, it will provide suggestions for future research. And finally, concluding remarks are included.

5.1 Implications for Practice and Recommendations

Through analysis of survey responses, focus group interviews, and systemic data, this section aims to provide practical applications that may be considered when designing and implementing a peer review solution regardless of the discipline. Although this study was of a single case focused on doctoral dissertation students, several of the findings are supported by the literature in other higher education contexts. With any study results, it's necessary for the reader to understand the case context and

conditions under which the study was conducted to determine for oneself how the findings may be relevant in their particular situation. The premise of this particular case of doctoral dissertation students participating in a peer-to-peer learning experience guides the recommendations that follow.

This section will first outline key factors, proposed actions, and practical considerations when implementing a peer review process for general applications. It will then provide a more detailed set of recommendations for doctoral degree programs that desire to deploy a peer-to-peer learning pedagogy as a part of the dissertation experience.

5.1.1 General Application

While peer review itself is considered a viable strategy for a variety of purposes, it is the design factors themselves along with non-peer review components that may influence the ultimate outcomes. The results of the present study and literature reviewed confirmed that the peer review process can not be considered an isolated event or strategy. It must be connected to the broader goals of the curriculum and the associated activities, and a peer-to-peer learning model must serve as the foundation. Additionally, this study and existing literature show that experience with the peer review process can influence the attitude towards the peer review process and the quality of the peer review outcomes. Participants from the present study had been engaged in the peer review process since the beginning of their doctoral program and began working on their dissertation with this previous experience and perceptions of the value peer reviews may or may not provide to them.

The present study did not attempt to measure all possible factors that should be considered when designing a peer review process, but identified specific factors that emerged from the literature reviewed or comments from participants within the present study. Several factors or decision-making elements emerged from the literature reviewed and the findings from the present study that may be relevant to a more general implementation of a peer review process. These recommendations will need to be adapted depending on the discipline, assignment being reviewed, purpose of the peer review exercise, the size of the group, the desire for sense of community, and other variables.

Peer Review Implementation Considerations

A peer review process requires a foundation of a peer-to-peer learning pedagogy. Similarly, the peer review process should be integrated into the overall learning curriculum. Instructors or program leaders should consider the purpose of the peer review exercise. For example, is the purpose to improve writing, improve content, or improve a sense of community? The purpose will then guide the specific requirements of the exercise. This may include students following a ratings-based rubric, annotating the

works being reviewed, reviewers being rated, and/or authors completing a self-review. Additional types of requirements may include how many reviews need to be completed during a single timeframe and how often someone's work will be reviewed. Of equal importance is how instructors will assign the reviewers. Will they be randomly-assigned or will they be based on a specific methodology, such as connecting students with similar topics? A platform should be selected that aligns with the goals and requirements of the exercise. It is necessary for the platform to not interfere with the purpose and value of the peer review exercise itself. Prior to students participating in a peer review exercise for the first time, the present study revealed that ensuring students are familiar with the project requirements, the purpose of the peer review exercise, and the platform can enhance the quality of the review. As peer review is incorporated more often into the curriculum, students will become more familiar with the platform.

While the students' knowledge of the process may influence the quality of the review, the perception of the review process may influence the quality in the same way. The present study revealed that students need to feel connected to the content and/or their peer(s). Instructors should consider how much time to allocate to the exercise to ensure that students have the capacity to complete the necessary review and not feel that it impedes the completion of their own work.

While the sample of peer review factors described above can be considered across a variety of circumstances, the next section will provide more specific recommendations relevant to doctoral programs deploying a peer-to-peer learning model.

5.1.2 Doctoral Dissertation Application with Peer-to-Peer Collaboration

Typical doctoral programs do not deploy a peer-to-peer learning model. The program associated with the present study centered on an innovative peer-to-peer learning model and currently includes over 200 students in the full program and 54 students actively working on their dissertation by the conclusion of this study. The size of doctoral programs, their specific requirements, and the approaches to the dissertation process vary widely across universities and disciplines. The recommendations that follow are based on adaptations from the existing literature, outcomes of this specific case study, and the perceptions and insights of the inside researcher who is a student and a graduate assistant of the program. While not suggested as generalizations for all doctoral programs, these recommendations serve as considerations when establishing a peer-to-peer learning model that encourages a sense of community, including a peer review process as a part of the dissertation.

The recommendations include the following three key components:

1. Synchronous Group Sessions
2. Peer Learning Community
3. Peer Review Process

Synchronous Group Sessions

Incorporating synchronous group advising sessions enables students to connect with advisors and peers in a collaborative way. Students share their own progress and observe the progress of others, which allows students to identify peers who may be working towards the same milestone, are researching the same topic, or are experiencing similar challenges. It also provides opportunities for peers who may be further along in the process or who have overcome similar challenges to share their insights and lessons learned. Students should also be encouraged to establish small research groups, either on the basis of topic or stage in the process. These sessions could include open discussions or structured writing sessions.

Peer Learning Community

The present study did not examine the influence of the online peer community specifically. However, this element is suggested as it serves as an added layer to the foundation of a peer-to-peer learning model. A peer learning community enables open, multi-way asynchronous communication between students. While incorporating structured assignments within the peer community may lead to obligatory participation, similar to assigning peer reviews, it can contribute to the overall sense of community or effectiveness of the program. It provides opportunities for students to share progress with their advisors and peers outside of the synchronous sessions. It also enables familiarity of peers who are working on the same stage, making it easier to know who to connect with.

Peer Review Assignment Methodology

The literature reviewed demonstrates benefits to both open and anonymous peer reviews as well as authors serving as reviewers. Based on both quantitative and qualitative data from the present study, an open peer review assignment should be deployed with authors serving as reviewers throughout the exam-dissertation process. When considering how to assign reviewers, a multi-faceted strategy has been proposed as a result of the findings of the present study. Instead of considering this a peer review assignment methodology, the goal is to establish an intimate peer learning community in conjunction with the broader peer community. The following recommendation involves a core set of three reviewers that partner with an author throughout the author's exam-dissertation sequence.

Figure 5.1 *Intimate Peer Communities (Francis, 2021)*

(I) Peer Progress: *Two students who are at the same stage and stay together for the duration of their progress*

The findings from the present study reflect the value of being aware of others' goals and concerns and identifying congruence with one's own goals and challenges. This partnership can establish a sense of community and also lead to collaboration outside of the formal peer review process, such as writing sessions or text check-ins. This strategy comes with opportunities and risks. The opportunities are that the partnership can lead to timeliness of completion as both students are working towards the same milestone and encouraging one another. They also can answer one another's questions if one is unsure of something. The opposite may become a risk if one student is unable to fulfill his or her commitments. Similarly, a risk exists when one student completes a milestone or graduates and the other may feel left behind. The results of the present study imply that peers will continue to support one another if a sense of community is established between the two individuals, even if they advance at different progression rates. There is also the risk that neither peer knows the answer or has misunderstood something and in turn provides inaccurate feedback. Remedies to this risk are the inclusion of multiple peer reviewers and a requirement to attend the synchronous supervisor-led advising sessions. Another risk in any working relationship is that the partnership has conflicting dynamics, whether due to availability, personality, or motivation. A contingency plan should be available for a student to seek a different peer review partner.

(II) Peer Research Topic: *Two students who are in a similar research area and stay together for the duration of their progress*

The findings from the present study reflect the high importance of collaborating with someone with a similar research interest or knowledge of the subject area. This partnership may be more difficult to establish depending on the program population and the student's research topic. It is necessary to be familiar with the entire set of program participants and not only those who are actively working in the exam-dissertation sequence to identify a possible match. It is important to have an updated inventory of students, their research interests, educational background, and work experience. One or all of those may make this a workable partnership to fulfill this criterion. This could involve a self-selection or advisor selection process. The partnership may be formed with a student who is still pursuing their regular coursework. As a result, this partnership most likely will result in incongruent stages. However, this can be considered an opportunity where the student actively working on the exam-dissertation sequence can serve as an informal mentor to the other student and the mentee can learn from the work of the mentor and ask questions relevant to their regular coursework or the program overall.

If the reviewer is selected from the broader program population and not someone actively working on the exam-dissertation sequence, this will require commitment from the mentee as they will be balancing their workload of their regular course(s). It may be necessary to articulate this as a programmatic requirement communicated to all program participants upon joining the program. However, this should not be seen as a burden or something extra to do, but rather an opportunity for the reviewer mentee to be more prepared for their own experiences in the doctoral program overall and dissertation sequence. The results of the present study confirmed that sense of community stemmed from really knowing someone, knowing their concerns, and their goals. By establishing connections early in one's doctoral journey, this can increase sense of community overall for both participants.

In conjunction with this strategy would be the intent of this peer review exercise. This study found that content-related feedback was of equal importance as process-related content. Students who have not yet arrived at the dissertation stage or at one of the steps themselves can focus their review on the subject matter rather than the requirements or structure. It's also worth considering how often this reviewer is involved. It may not be necessary that they review every version of the work.

(III) Peer Advisor: *A reviewer who is further along in the sequence and would stay with the author for the duration of their progress*

The purpose of this reviewer would be to confirm that requirements are being met. It would not be expected that they understand the details of the subject matter or research study itself, but rather that all steps are being followed and requirements are being addressed. In the absence of an instructor review

at every step, a peer advisor-type role can help to identify common mistakes prior to the formal advisor or committee review step. They can share feedback based on what they have experienced and learned themselves. And authors can feel greater confidence that their peer is providing appropriate, quality feedback. This too would require a level of commitment from the reviewer, especially as they graduate, as there is a risk that the alumna may not be as connected to the program as one may desire.

Peer Review Purpose

In conjunction with the overall peer community and the intimate peer learning communities, the purpose and timing of the peer review should be defined and communicated at each milestone for each reviewer type and not be the same at every step. For all steps, except the final dissertation, works should be routed for peer review prior to advisor review. The purpose of the final dissertation peer review should be on peer editing and sharing any insights that emerge that may or may not be feasible to implement at this stage in the process. Representative rubrics should be incorporated into this process to increase the effectiveness of the review process.

Summary

Strategies two and three become a cycle where the author in strategy two becomes the advisor in strategy three. However, there is always a risk that one member of the partnership will withdraw from the program, take an extended leave of absence, and/or pass up the other in their stage of the dissertation sequence. In this scenario, and in general, a contingency plan should be established to ensure that every study has at least two active reviewers at all times throughout the process.

The goal of this proposed strategy is to have at least one reviewer who is familiar with the content area, another who is familiar with the process, and another who is familiar with the author and their work, all while strengthening the connection throughout the six-step sequence. This recommendation also addresses findings from the present study associated with the time commitment required to provide meaningful, high-quality peer reviews. Students will only need to skim the previously-submitted work for changes and then can spend quality time on the new contributions.

5.2 Study Limitations and Directions for Future Research

The present study did not intend to provide sweeping generalizations, but rather strived to contribute to the body of knowledge in the areas of sense of community, peer review, online learning communities, and doctoral exam and thesis preparatory methods. While the outcomes of the present study can serve as a guidepost or provide insight into the model examined, it is important to acknowledge

challenges with the present study's data analysis and corresponding limitations and the context of this specific case.

5.2.1 Challenges in the Data Analysis

Several challenges arose during the analysis phase of this study, but did not pose significant risks.

1. **Identifying the time periods**. While the time periods were selected based on the initial date of the survey being available, the length of time between surveys was not perfectly equal, and participants completed the survey at various times within the time period.

2. **Placing peer review data into a relevant time period**. A single date was available based on the project start date and not necessarily when the peer review was completed. However, this appeared to pose no risk to this study.

3. **Survey response rate across time periods**. Not all participants took all four surveys, even if they were involved in the sequence for the entire duration of the study. Only six participants completed all four surveys. And 31 out of 53 participants completed at least two surveys. This resulted in a 58.5% comparison response rate. Additionally, the motivation of survey participation is unclear. Is there a correlation between sense of community and survey participation?

4. **Survey introduction**. The survey was introduced into the curriculum around January 2020. However, 19 participants had already begun the exam sequence. No baseline data were available for those participants. Their responses to the January survey were used as a baseline for the purpose of the present study.

5. **Survey (in)completion for those beginning the process**. The survey was intended to serve as a baseline for anyone who was beginning the process. In four cases, a new participant took the survey, but did not complete all questions. It some cases, participants did not take the survey at the beginning of their time in the sequence, even though the survey was available.

5.2.2 Study Limitations and Suggestions

The following limitations lead to opportunities for additional research.

Inside Researcher: The researcher is the graduate assistant for the program and collaborates directly with the program leaders and shares student feedback with program leaders in order to regularly iterate and enhance the doctoral program and experience of its students. Focus group participants were aware that feedback from the session would be anonymously shared with program leaders in an effort to ensure that their voice was being heard. Participants may have shared certain feedback in hopes of being

a catalyst for desired changes. A future study could be conducted by an outside researcher to determine if similar results were found.

Limited Time Period and Participant Pool: In an effort to accomplish the researcher's own dissertation in a timely manner, it was necessary to put a time boundary on the present study. While over a year's worth of data contributed to the value of the present study, the number of participants who made it through the entire process was minimal. With the program launching in August 2017, only 59 students had begun the exam-dissertation sequence during the present study, and even fewer had made it through multiple parts of the multi-step process. This study could be repeated in the future to capture a greater number of participants and longer duration of their participation.

Participant Sets: Some students were further along in the process than others. Another study could include a set of students from the very beginning of their time in the sequence and ensure that all surveys are completed in order to increase the number of eligible participants to strengthen the comparison data.

A Single Case: A single case only demonstrates outcomes for the participants of the present study. A multiple case study could be conducted using the same methodology to determine if these results can be more generalizable across different populations, including different disciplines or different doctoral program designs. While the present study was designed with a specific program curriculum as the foundation, the study framework could be adapted to align with other programs.

Evolving Processes: The present study involved examining an existing program and did not attempt to define or limit changes to the curriculum, processes, or requirements. The program addressed in the present study has a policy and practice of continuous improvement given its experimental and unique nature/design, and therefore was regularly iterating and evolving throughout the entire study period. Survey data and peer review contributions later in the present study may have been the result of the evolution or some other factor and not specifically an increase in sense of community. This study could be replicated in the future after the program has been in existence for a few years.

Survey Adjustments: The program added four new questions prior to the third and fourth survey regarding sense of community and goals being met. Participants could self-report their sense of community increase and the reason for their response. This survey could be adjusted to change the question format to align more closely with the questions that contribute to the Sense of Community score in order to strengthen the credibility of the score calculations. This same study could be repeated with a new set of students to capture the same data sets at each time period within the study. Additionally, the survey could be revised to align more closely with the purpose of the planned study.

5.2.3 Additional Research Opportunities

The present study focused on only a few elements associated with the peer review process, but identified several program, peer, and student-related factors that represent constitutive elements of sense of community, including peer review rubrics, the peer review assignments, advisor and graduate assistant support, resources, and capacity. Each of these factors warrant further research, such as investigating the specific impact of the synchronous advising sessions, graduate assistant support, resources, or the online peer community. Additional studies could examine other peer review factors, such as the self-review, review of review score, the rubrics, or the revised peer review assignment methodology, as described in *Section 5.1.2.* Each of these factors could be explored in the context of sense of community or task outcomes.

5.3 Summative Conclusion

The results of the present study demonstrated that medium and high sense of community persisted throughout the duration of the present study. This persistence was regardless of the students' frequency of participation in the peer review process, but instead through participation in a peer-to-peer learning model and peer review process overall. The present study also revealed several program, student, and peer review factors relevant to this specific case that can be considered as one is designing their own peer review process. While the present case study was able to provide context for these ideas, there is more work to be done before peer review can become a generally accepted and commonly implemented approach to learning and assessment by designers, instructors, and learners, especially in the doctoral dissertation process. Additionally, a holistic approach must be considered for the conditions for sense of community to be established. Peer review is only one element and is not an isolated event or set of events. Equally so, sense of community does not occur through a single event or factor and must be fostered through a variety of strategies to accommodate student's varying definitions of what sense of community means for them.

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APPENDIX A: EXAM-DISSERTATION-SEQUENCE SURVEY

Francis (2019) Adaptation of Rovai's (2002) Sense of Community Scale   *Collected as a part of the exam-dissertation sequence*
1. I feel my peers in the EDS care about each other
2. I feel that I am encouraged to ask my peers questions about my topic, about the EDS process, and/or about the deliverables
3. I feel connected to my peers in the EDS
4. I feel that it is hard to get help from my peers in the EDS
5. I do not feel a spirit of community participating in the EDS
6. I feel that I receive timely feedback and support from my peers on my updates and peer-reviewed projects
7. I feel that engaging with my peers in the EDS is like a family
8. I feel uneasy exposing gaps in my understanding to my peers about the EDS process, including my topic or deliverables
9. I feel isolated from my peers in the EDS
10. I feel reluctant to speak openly with my peers in the EDS
11. I trust my peers in the EDS
12. I feel that engaging with my peers in EDS results in only modest outcomes
13. I feel that I can rely on my peers in the EDS
14. I feel that my peers do not help me reach my exam-dissertation goals
15. I feel that my peers in the EDS depend on me for support and feedback
16. I feel that I am given ample opportunities to learn and improve from my peers
17. I feel uncertain about my peers in the EDS
18. I feel that my educational needs are not being met by the EDS
19. I feel confident that my peers will me support me in the EDS
20. I feel that the EDS does not promote a desire to meet my exam-dissertation goals

Additional Survey Questions
Collected as a part of the exam-dissertation sequence
Demographic
Term and Year began the program
Actual or Planned Term and Year to begin the Exam-Dissertation sequence
Number of Program Courses completed, including current term
I feel that my level of sense of community influences the quality of peer reviews that I complete
I feel that knowing my reviewers and/or authors influences my sense of community
I have found my role as a Peer Reviewer to help me improve my own work
I feel that I improve as a reviewer with each review opportunity
I feel that if I know who is reviewing my work, I would provide a higher quality draft for review than I would if I did not know who was reviewing my work
I feel that if the author knows I am reviewing his/her work, I would provide a higher quality review than if I were to remain an anonymous reviewer
I feel that if I know whose work I am reviewing, I would provide a higher quality review than if I did not know whose work I was reviewing
I feel that if I know whose work I am reviewing, I would be comfortable being completely honest in my review
I rely on the peer review rubric to create my own work
I am able to take action on the peer review ratings and comments provided by my peers
I am able to take action on the annotations provided by my peer reviewers
I feel that my final versions are of higher quality as a result of the peer review feedback that I receive
I feel that the 'review of the review' ratings that I receive encourage me to provide high quality reviews
I feel that I experience a sense of community as a result of the peer review process
Please provide general comments about your peer review experience prior to the doctoral dissertation sequence.
Please provide general comments about your peer review experience so far in the doctoral dissertation sequence. If you have not yet participated in a peer review exercise for the dissertation sequence, input N/A
Please provide any additional feedback that you might have about the doctoral program or the exam-dissertation sequence.
Do you feel that you are meeting your exam-dissertation goals?
Please explain what has contributed or inhibited you from meeting your exam-dissertation goals.
Questions added in August 2020
Have you felt an increase in feeling a sense of community since you began the exam-dissertation sequence?
Describe what you feel has contributed to your change (either increase or decrease) in feeling or not feeling a sense of community.
Do you feel that you are meeting your exam-dissertation goals?
Please explain what has contributed or inhibited you from meeting your exam-dissertation goals.

APPENDIX B: FOCUS GROUP INTERVIEWS

Basic information will be collected about each focus group participant prior to the focus group session:

1. Year and Term started the program
2. Year and Term started the exam-dissertation process
3. # of courses enrolled in within the primary program (minimum 4, but up to 6 are possible)
4. Program (primary program or other program)

Tentative Focus Group questions include:

1. What was your general impression of the peer review process during your regular coursework?
2. What factors do you feel contributed to your experience (positively or negatively)
3. Did you feel inhibited or encouraged to provide authentic feedback?
4. Do you tend to gravitate towards positive or constructive feedback over the other?
5. In what ways do the rubrics help or hinder your perception, motivation, and peer review outcomes?
6. How would you define sense of community? (then maybe share what the research definitions are)
7. In what ways have you felt or not felt a sense of community within the program?
8. What do you feel has contributed to your feeling or lack of feeling a sense of community?
9. In what way do you feel your sense of community contributed to your peer review experience and outcomes?
10. What has been your experience as a reviewer so far with the peer review process as you work on the exam-dissertation sequence?
11. Have you felt a desire to dialogue with your reviewers/authors? Why or why not?
12. What has been your experience as an author so far with the peer review process as you work on the exam-dissertation projects?
13. In what ways have you felt supported by program leaders?

APPENDIX C: CGSCHOLAR DATA

Works and Peer Review Data

1. Publisher Name

2. Project Name

3. Rubric Name

4. Work Name

5. Draft Submitted Date

6. Review Assigned Date

7. Review Submitted Date

8. Revision Submitted Date

9. Publication Date

10. Author Name

11. Author ID

12. Reviewer Name

13. Reviewer ID

14. Rubric Item Title

15. Rating for each Rubric Item

16. Comment for each Rubric Item

17. Review of the Review Score

18. Comment from Review of the Review

19. Number of Change Annotations

20. Number of Comment Annotations

21. Work ID

22. Percentage of revisions made

23. Number of words in the Work authored

APPENDIX D: CGSCHOLAR ECOSYSTEM

Common Ground Scholar (CGScholar) is a social knowledge ecosystem for teaching and learning across all subject areas, from grade 4 to university and beyond. CGScholar is the product of cutting-edge research and development into big data and artificial intelligence, developed by educators and computer scientists at the University of Illinois.

CGScholar is does what no other learning platform does. In its integrated suite of apps, it supports the following pedagogical functions:

1. An inclusive class engagement space;
2. A collaborative workspace, driven by a "help economy";
3. A dynamic, just-in time learning analytics engine;
4. An anywhere/anytime web portfolio for ubiquitous learning;
5. A professional place for interactive course design and delivery.

cgscholar.com

CGScholar is:

1. An inclusive **class engagement** space - the **COMMUNITY** app

The "Community" app in *CGScholar* is part social media feed, part blog, part learner or educator profile page, part work portfolio. Educators can deliver content into learners' activity feeds in many media formats including videos and simulations. Every learner is encouraged to respond and interact with others' responses. Learners can also be content contributors, to which others respond. In this way, they become as much knowledge creators as they are knowledge consumers.


From ...

To...

CGScholar supports classical "classroom discourse" with some enormous differences:
- everyone can be expected to respond rather than just the person who puts up their hand;
- active participation is balanced with reception;
- discussion can happen anywhere and anytime; and
- learning analytics can assess learner contributions.

2

2. A **collaborative workspace,** *driven by a "help economy" - the* **CREATOR** *app*
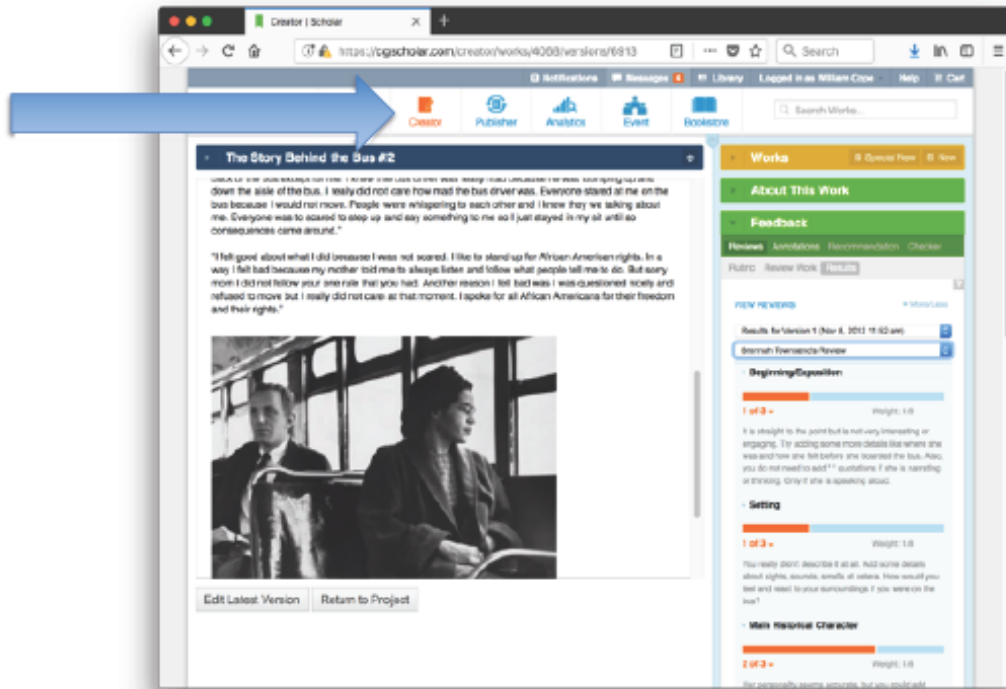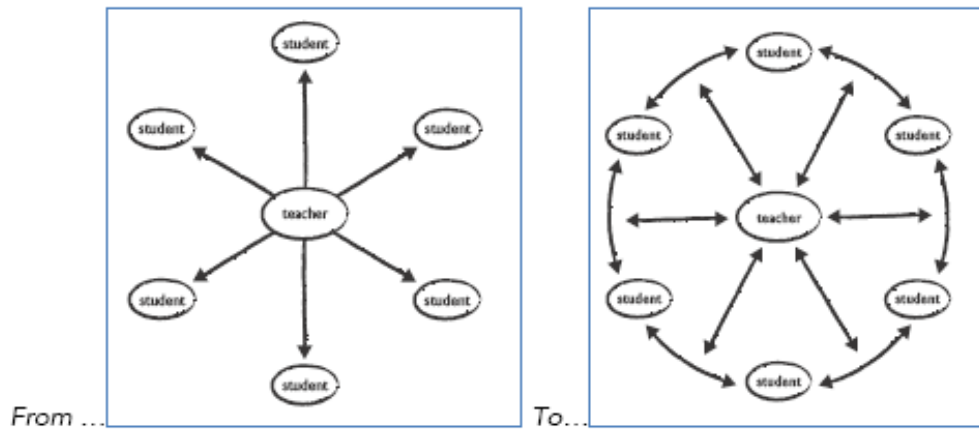

The "Creator" app in *CGScholar* is a multimodal workspace, where learners can create multimedia projects, including text and (inline) image, video, audio, dataset or any other digital knowledge artifact. It is also a social workspace where peers and admins can offer constructive feedback against assessment rubrics, created by the educator. Unlike web writing spaces such as Google Docs/Classroom, clear versioning tracks learner progress towards project objectives.

The role of the educator changes, from transmitter of content to passive learners, to designer of a learning ecology. This is classical supply-response assessment with some huge differences:

- constructive feedback increases tenfold or more;
- it happens during and for learning, rather than at the end in the form of judgement that it is too late to address;
- it requires learners to think metacognitively about the conditions of their knowing;
- it "crowdsources" assessment to the multiple perspectives of admins, peers, and self;
- it makes teachers' work more efficient, limited to feedback that can't be offered by peers and self-reflection; and
- students are motivated by the sociability and mutual obligations of a "help economy."

From ...   To...

3. A dynamic, just-in time *learning analytics* engine the - ANALYTICS app

This visualization of learning metrics is based on 7,975 metric values derived from 1,866,767 total data points collected across all members of this community.

CGScholar's "Analytics" app sets out to end the distinction between instruction and assessment. There is no learning without immediate machine and human feedback. There is no specialized assessment because everything is assessed. *CGScholar* offers approximately fifty different kinds of actionable feedback, including:

- a computer suggestion, such as a writing suggestion with an explanation of the reason for that suggestion;
- a peer idea offered in response to a review criterion;
- a coded self, peer or teacher annotation;
- a comment in a class discussion; and
- a response to a question that has a right or wrong answer (in CGScholar's select response "Survey" app).

CGScholar measures three things:

- demonstrable knowledge;
- focus or effort; and
- help, or the quality of learning collaboration.

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CGScholar sets out to end the distinction between instruction and assessment. There is no learning without immediate machine and human feedback. There is no specialized assessment because everything is assessed.

For a learner, there may be thousands of such datapoints in a unit of work or course. *CGScholar* provides learners and their professors with clear progress visualizations based on these data. Learners can access personal data presentations; instructors can access both cohort and individual data presentations.

Every learner can now succeed because at any point in their learning they can see what they still need to do to meet the educator's expectation in a learning module. And educators can see which learners require special attention.


From...   To...

TRADITIONAL ASSESSMENT	LEARNING ANALYTICS
Tests long term memory	Evaluates capacity to create knowledge from available sources
Focuses on facts and procedures, a narrow cognitive range	Focuses on higher level thinking, a broad cognitive range
Measures individual cognition	Focuses on the relationship of individual to collaborative thinking
Of learning, limited feedback, not actionable	For learning, with rich actionable feedback
Fearfully judgmental experiences	Embedded assessment is the learner's friend
Score discriminations and grade distributions insist on inequality	Mastery learning: every learner can succeed!

6

CGScholar is:

4. An anywhere/anytime **web portfolio** for ubiquitous learning
## - the **COMMUNITY** app
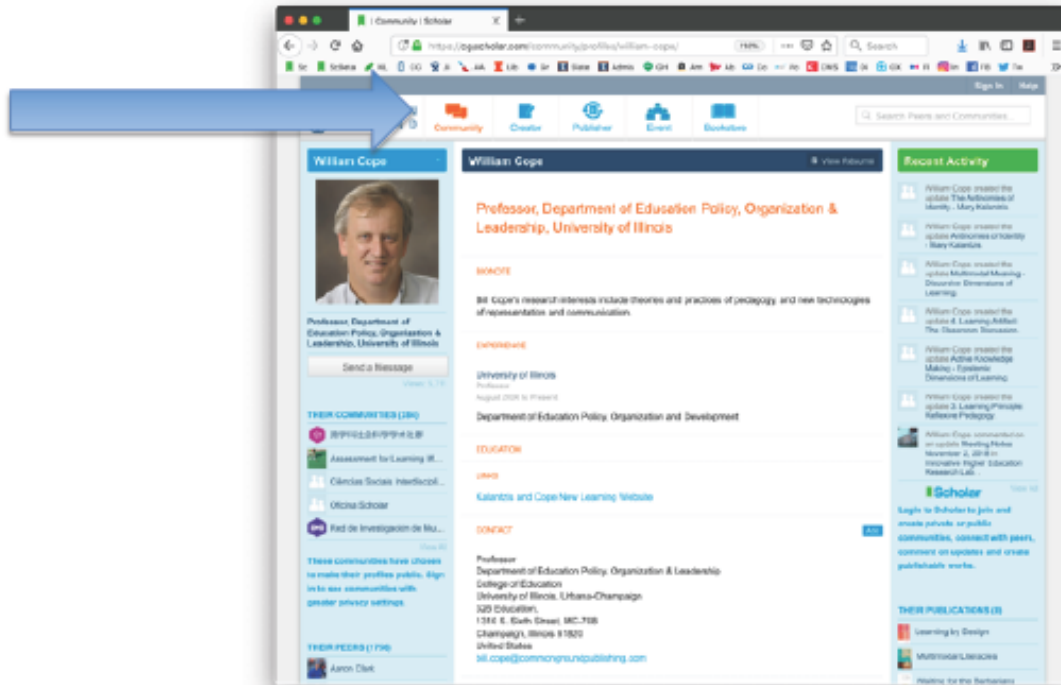
CGScholar offers every student a personal profile and portfolio page that they can keep for life and make private or share publicly. They can continue to maintain it, even create new professional or alumni communities after they have left the school, or they can just keep it as a privately archived record of all their school work. They can direct potential employers to these pages.

Every educator also has a self-maintainable profile page including learning modules they may have published in *CGScholar*, and any other videos and publications they may choose to share. This replaces the perennially out-of-date "last leaf" on the school's website.

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CGScholar is:

5. A professional place for **interactive course design** and delivery

- the BOOKSTORE app
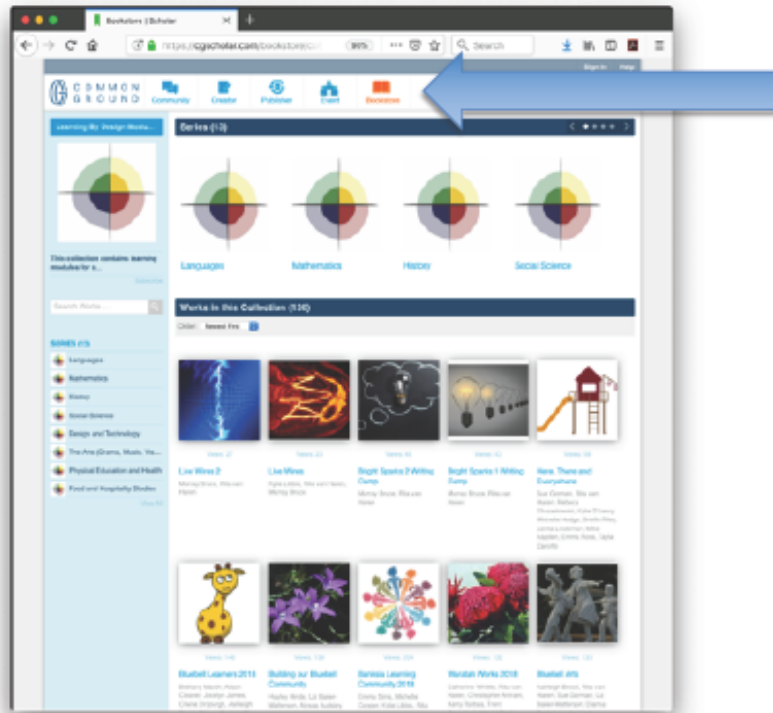
CGScholar's "Learning Module" is a hybrid educational content curation and delivery genre, somewhere between a syllabus and textbook, yet quite different from both. Contrasted with the textbook, in a *CGScholar* "Learning Module," an instructor does not summarize the world; they curate the world. They prompt research and discussion. They launch surveys ("Knowledge Surveys" which by definition have definite answers, or "Information Surveys" which can reflect legitimate differences of perspective between participants). They manage projects which include prompts and recursive feedback rubrics.

- If an e-textbook delivers content, *CGScholar's* Learning Module scaffolds learner activity while providing supporting content.
- If an e-book positions learners as knowledge consumers, the Learning Module positions them as knowledge producers.
- If an e-book is read-only knowledge, the Learning Module scaffolds read-write knowledge.

The Learning Module supports a wide range of pedagogical designs, from active self-construction of knowledge to direct instruction.

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CGScholar is:

The product of cutting-edge research and development into big data and artificial intelligence for education

We are standing at the cusp of a revolution in education, primarily pedagogical, but nevertheless enabled by computer-mediated tools in support of learning and assessment.

EDUCATION 1.0	EDUCATION 2.0
Teacher-centered	Learner as agent, participant
Learner as knowledge consumer	Learner as knowledge producer
Knowledge transmission and replication	Knowledge as discoverable, navigation, critical discernment
Focus on long term memory	Devices as "cognitive prostheses"—social memory and tools of analysis
Knowledge as fact, correctly executable theorem, definition	Knowledge as judgment, argumentation, reasoning
Cognitive focus	Focus on knowledge representations, "works" as knowledge representations
Individual minds	Social, dialogical minds
Long cycle feedback, retrospective and judgmental (summative assessment)	Short cycle feedback, prospective and constructive (reflexivity, recursive feedback, formative assessment)

Developed by a team of educators and computer scientists at the University of Illinois, CGScholar is grounded in cutting-edge research and development, applying artificial intelligence and big data analytics to e-learning ecologies. The University of Illinois is the site of many world-changing innovations, from the world's first e-learning system in 1959, to the first web browser.

For users, *CGScholar* is as simple as having an internet-connected device with a web browser. However, behind the platform is a decade of intensive research and development funded by major grants from the Institute of Educational Sciences in the US Department of Education, the Bill and Melinda Gates Foundation, and the National Science Foundation.

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In our current research and development agenda, we are pushing forward with the following ambitious developments:

- machine feedback on higher level thinking;
- comparing learners' knowledge representations against a "model of the world;" and
- thought maps and visualizations.

Learn more about the thinking behind CGScholar

Research Website
newlearningonline.com

Blog @ CGScholar.com
https://cgscholar.com/community/community_profiles/new-learning/community_updates

MOOCs @ coursera.com
- e-Learning Ecologies
- Ubiquitous Learning
- New Learning
- Assessment for Learning

Selected Academic Publications
- Cope, Bill and Mary Kalantzis, eds. 2015a. *A Pedagogy of Multiliteracies: Learning by Design.* London: Palgrave.
- Cope, Bill and Mary Kalantzis. 2015b. "Assessment and Pedagogy in the Era of Machine-Mediated Learning." Pp. 350-74 in *Education as Social Construction: Contributions to Theory, Research, and Practice,* edited by T. Dragonas, K. J. Gergen, S. McNamee and E. Tseliou. Chagrin Falls OH: Worldshare Books.
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- Cope, Bill and Mary Kalantzis, eds. 2017. *E-Learning Ecologies: Principles for New Learning and Assessment.* New York NY: Routledge.
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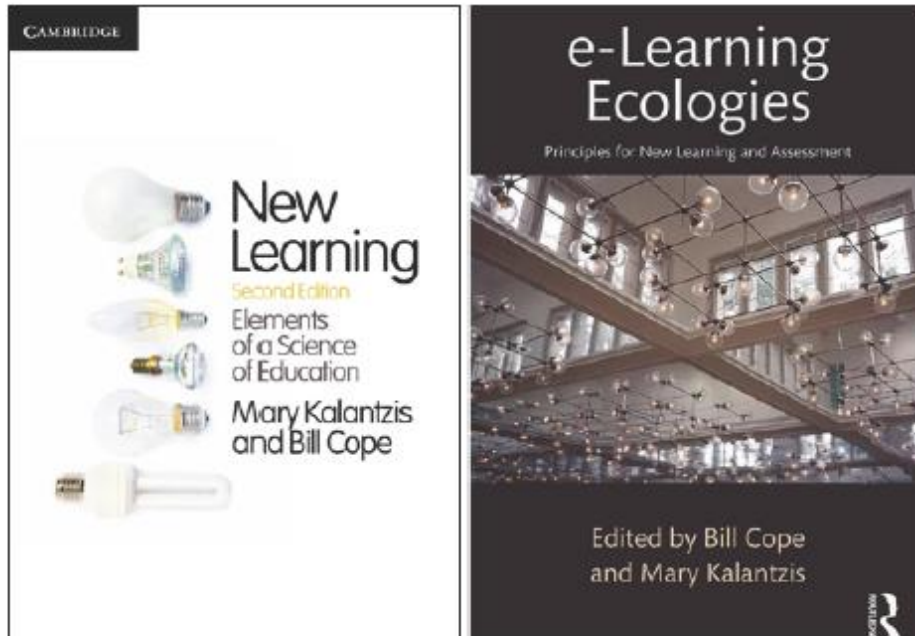
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APPENDIX E: IRB LETTER

I ILLINOIS

Notice of Exempt Determination

May 26, 2020

Principal Investigator	William Cope
CC	Kara Lynn Francis
Protocol Title	*CGScholar data and Focus Groups*
Protocol Number	20845
Funding Source	Unfunded
Review Category	Exempt 1 & Exempt 4 (ii)
Determination Date	May 26, 2020
Closure Date	May 25, 2025

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Office for the Protection of Research Subjects (OPRS) has reviewed your application and determined the criteria for exemption have been met.

The Principal Investigator of this study is responsible for:
- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Requesting approval from the IRB prior to implementing major modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

Changes to an exempt protocol are only required if substantive modifications are requested and/or the changes requested may affect the exempt status.

APPENDIX F: RECRUITMENT LETTER

As a current participant in the LDL Exam-Dissertation sequence, you are invited to participate in the following research study: Investigating how sense of community and peer review influence one another and influence peer review outcomes for doctoral dissertation students. It will also examine the implications of peer review factors on these outcomes.

Participation in this study is completely optional and has no impact on your exam-dissertation sequence outcomes or assessment.

Please refer to the attached document for the research study details and the informed consent letter.

Informed Consent Cover Letter

Researcher: Kara Francis; kstucki@illinois.edu

Research Supervisor: Bill Cope; billcope@illinois.edu

Dear Prospective Participant,

My name is Kara Francis. I am completing my doctoral education and dissertation under the supervision of Dr. Bill Cope and Mary Kalantzis. The purpose of my dissertation research study is to investigate how sense of community and peer review influence one another and influence peer review outcomes for doctoral dissertation students. It will also examine the implications of peer review factors on these outcomes. I am seeking your consent in the participation of my dissertation research project.

Participation in this study is completely optional and has no impact on your exam-dissertation sequence outcomes or assessment.

Research Study Title

SENSE OF COMMUNITY AND THE PEER REVIEW PROCESS - EXAMINING FACTORS INFLUENCING TASK OUTCOMES: A CASE STUDY OF A DOCTORAL DISSERTATION EXPERIENCE

Researcher Role

I am an internal researcher who is a participant of the program presented in this case. I am also a graduate assistant of the program and assist the program leaders and students in various capacities. I am intimately familiar with the program and the process. As a participant in the program, I will serve as a peer reviewer and my work has been peer reviewed. Participants complete and receive approximately 24 peer reviews throughout this six-step process. Costley (2010) claims that "when researchers are insiders, they draw upon the shared understandings and trust of their immediate and more removed colleagues with whom normal social interactions of working communities have been developed" (p. 1).

Informed Consent Document

The attached informed consent document will detail important features of your potential participation in the study, including your rights as a participant. The study will follow the principles of Responsible Research and Innovation, including Ethics and Integrity as research design principles, and openness and transparency as fundamental to the balanced communication of the research methods, results, conclusions, and implications of the study.

Prospective Participants

You are invited to participate in this research study because you are a member of the target audience of this research study, which is LDL exam-dissertation students. We are seeking students who have experienced the peer review process as a part of their doctoral coursework and who have begun the exam-dissertation sequence.

The benefits of the research will include:

1. Fill a gap in the literature by examining factors that may influence peer review effectiveness and task outcomes that haven't been examined in the same way in previous studies.
2. Address the doctoral dissertation student audience, which hasn't been the focus of very many studies.
3. As online doctoral programs continue to emerge and the volume of graduate students increases, the hypothesis of this study is that both sense of community and peer collaboration will be critical elements to the success of the students and the viability of the program. It may also be the case that effective peer review process can contribute to a sustainable support model for high student-to-faculty ratios. This becomes even more relevant as we are actively responding to the COVID-19 pandemic and all educational institutions have moved to distance learning
4. For both online or on-campus doctoral programs, this study strives to understand the ways in which a peer review process can influence the sense of community and outcomes of the dissertation process, again, even more so as on-campus students are now completing their degrees remotely.
5. Ultimately, this study aims to provide the evidence to develop a framework for considering the variety of factors that may influence both peer review and other task outcomes for the doctoral dissertation process and other learning environments and contexts.

Data Collection

This study involves both qualitative and quantitative data, including focus groups, discussion posts/comments, surveys, and aggregated, available data from the CGScholar platform, such as peer review results.

Your participation would involve:

1. Quantitative and theme analysis on survey responses for the Sense of Community and Peer Review survey, which is administered as a part of the program curriculum and will be administered multiple times throughout your exam-dissertation experience.
2. An invitation to participate in one or more 60-minute remote focus group sessions using Zoom that will address the topics of peer review and sense of community before and during the doctoral dissertation experience. These sessions will not be recorded, but notes will be taken without the inclusion of any names. The notes will then be analyzed.
3. Theme analysis on focus group responses
4. Theme analysis on discussion posts and comments within the LDL Doctoral Dissertation Sequence peer community

Any direct quotes would involve an additional consent/confirmation from the study participant(s). No actual names will be used in the analysis or distribution of the research results. Study participants will be given an opportunity to review interim and final drafts of the research report to ensure an accurate representation.

A message to Focus Group Participants
We will ask everyone in the focus group sessions to respect the privacy of other participants and to treat anything said in the group as confidential. However, please remember there is no guarantee that other participants will abide by that request.

What are my rights as a participant in this study?
Your participation in this study is voluntary and you are under no obligation to consent to participation. You are free to withdraw from the study at any point, without any consequences and without giving a reason. In the event that you decide to withdraw from the study, all focus group and survey responses will be eliminated from the data analysis, however, aggregated peer review data will be incorporated into the data analysis.

Unfortunately, there is no monetary compensation or material benefits from participating in this study. An objective of the study is, however, to enhance the experience of yourself, your peers, and future doctoral students engaged in the exam-dissertation process. While not a study objective, your participation may influence enhancements to the program's exam-dissertation sequence.

Consent Timeline
If you choose to participate, please print and sign this consent form and return it to me by June 1st. You may either email it to me at kstucki@illinois.edu in the form of a picture or scanned document or fax it to 952-545-0848. If you would like to mail it, please contact me for a mailing address.

Thank you for your consideration in participating in this research study as a part of my dissertation.

APPENDIX G: INFORMED CONSENT

Key Information

You are being asked to participate in a voluntary research study. The purpose of this study is to investigate how sense of community and peer review influence one another and influence peer review outcomes for doctoral dissertation students. It will also examine the implications of peer review factors on these outcomes. I am seeking your consent in the participation of my dissertation research project. Participating in this study will involve:

1. Quantitative and theme analysis on survey responses for the Sense of Community and Peer Review survey, which is administered as a part of the program curriculum and will be administered multiple times throughout your exam-dissertation experience
2. An invitation to participate in one or more 60-minute remote focus group sessions using Zoom that will address the topics of peer review and sense of community before and during the doctoral dissertation experience. These sessions will not be recorded, but notes will be taken without the inclusion of any names. The notes will then be analyzed.
3. Theme analysis on focus group responses

and your participation will last for the duration of your exam-dissertation experience. Risks related to this research are not expected.

Benefits related to this research include

1. Fill a gap in the literature by examining factors that may influence peer review effectiveness and task outcomes that haven't been examined in the same way in previous studies.
2. Address the doctoral dissertation student audience, which hasn't been the focus of very many studies.
3. As online doctoral programs continue to emerge and the volume of graduate students increases, the hypothesis of this study is that both sense of community and peer collaboration will be critical elements to the success of the students and the viability of the program. It may also be the case that effective peer review process can contribute to a sustainable support model for high student-to-faculty ratios. This becomes even more relevant as we are actively responding to the COVID-19 pandemic and all educational institutions have moved to distance learning
4. For both online or on-campus doctoral programs, this study strives to understand the ways in which a peer review process can influence the sense of community and outcomes of the dissertation process, again, even more so as on-campus students are now completing their degrees remotely.
5. Ultimately, this study aims to provide the evidence to develop a framework for considering the variety of factors that may influence both peer review and other task outcomes for the doctoral dissertation process and other learning environments and contexts.

Principal Investigator Name and Title: Dr. Bill Cope, Professor, Advisor, and Program Chair
Department and Institution: Education Policy and Organization Policy; University of Illinois at Urbana-Champaign
Contact Information: cope@illinois.edu

Informed Consent – Confidentiality:

Faculty, staff, students, and others with permission or authority to see your study information will maintain its confidentiality to the extent permitted and required by laws and university policies. The names or personal identifiers of participants will not be published or presented.

Informed Consent – Future Use of Research:

Your de-identified information could be used for future research without additional informed consent.

What are the potential risks and discomforts?

While all system and survey data will be immediately de-identified, participation in the focus group will result in other participants hearing your responses.

What other options are there?
You have the option to not participate in this study or to limit which portions of the study you participate in.

Will I be reimbursed for any expenses or paid for my participation in this research?
You will not be offered payment for being in this study.

Can I withdraw or be removed from the study?
If you decide to participate, you are free to withdraw your consent and discontinue participation at any time. The researchers also have the right to stop your participation in this study without your consent if they believe it is in your best interests, you were to object to any future changes that may be made in the study plan.

What are my rights as a research subject?

If you have any questions about your rights as a participant in this study, please contact the University of Illinois at Urbana-Champaign Office for the Protection of Research Subjects at 217-333-2670 or irb@illinois.edu.

CONSENT TO PARTICIPATE IN THIS STUDY

Researcher: Kara Francis; kstucki@illinois.edu

Research Supervisor: Bill Cope; billcope@illinois.edu

Research Study Title

SENSE OF COMMUNITY AND THE PEER REVIEW PROCESS - EXAMINING FACTORS INFLUENCING TASK OUTCOMES: A CASE STUDY OF A DOCTORAL DISSERTATION EXPERIENCE

I, _____ (participant name), confirm that I have been informed about the nature,

procedure and potential benefits and as well as my rights as a participant in the research study outlined in the above information sheet.

I confirm that:
1. I have read and understand the study as outlined in the information sheet.
2. I have had sufficient opportunity to ask questions and am prepared to participate in the study.
3. I understand my rights as a participant and that my participation is voluntary and that I am free to withdraw at any time without consequence or penalty.
4. I am aware that the findings of this study will be processed into a thesis, research report, journal publications and/or conference proceedings, but that my participation will be kept confidential and anonymous.

Participant Given Name & Surname_____

<div style="text-align:center">(please print)</div>

Participant Signature_____   Date_____

Researcher Given Name & Surname_____

<div style="text-align:center">(please print)</div>

Researcher Signature_____   Date_____