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A THEMATIC SYNTHESIS OF COMMUNITY OF INQUIRY RESEARCH

2000 TO 2014

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"I can tell you from experience, the effect you have on others is the most valuable currency there is." (Carrey, 2014)

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Abstract

This meta-synthesis study examines the nature, focus, and context of the large and diverse corpus of research literature that has arisen from a highly utilized and cited distance, blended, and online learning framework, the Community of Inquiry (CoI). The heterogeneous thematic synthesis was conducted using a three-stage approach. In stage one, online and locally installed proprietary and open-source research software programs were used to identify and aggregate a collection of 1,515 empirical research artifacts citing the seminal article that introduced the CoI. This data set was cross-tabulated and analyzed to establish reliability of research publication sources.

Stage 2 examination reduced the collection to 910 journal articles, conference papers, books, book sections, masters theses, doctoral dissertations, and non-academic papers. These 910 artifacts were examined for study inclusion criteria and to determine seminal article citation use. Of the 910 artifacts examined, 581 (64%) were excluded from further analysis; 258 for nominal citation use, and 323 for study parameter deficiencies. In stage 3, the 329 artifacts that met inclusion parameters were re-examined to determine the level and intent of CoI citation use within each artifact.

The synthesis was conducted in three steps; the first step to identify "basic" themes, the second "organizing" themes, and lastly "global" themes. Iterative, inductive coding of the 329-item synthesis dataset identified 24 basic themes ranging from citations to attribute use of simple descriptions to more complex uses of adopting CoI tools as methodology or validation of the CoI framework itself. The 24 basic theme codes were then examined for similarities and differences in order to postulate 11 organizing themes. Finally, the 11 organizing themes were scrutinized from varying perspectives to articulate

four global themes. The findings of this study show that the terms, concepts, processes, and tools described in the seminal publication are still germane to distance, blended, and online researchers and educators to define terminology, measure factors, introduce CoI-based concepts to positively influence learning conditions and experiences, and to validate or extend the framework itself.

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CHAPTER 1 - INTRODUCTION

This dissertation research consisted of a heterogeneous thematic synthesis of the corpus of research literature engendered by publication of the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000). The purpose of this study was to aggregate and thematically synthesize empirical studies published between 2000 and 2014 citing Garrison, et al. (2000) in order to better understand the nature, focus, and context of that body of research.

Chapter one explains the background to the study, delineates the research problem, and defines the primary and secondary research outcomes. The chapter also identifies the theoretical framework and scope of the research. The main research question and sub-questions are presented; however, the sub-questions articulated in this chapter are representative only, as thematic synthesis research methodology calls for an overlapping, iterative, inductive approach to data coding and analysis (Thomas & Harden, 2008). The significance of this study and its contributions to the distance education community are also discussed as are implications for other researchers. An outline of the entire study concludes the chapter.

Background of the Study

Since 2000, when the Community of Inquiry framework was first posited by Garrison, Anderson, and Archer, literally hundreds of researchers have used the CoI framework and its three elements of social presence, cognitive presence, and teaching presence as the basis for empirical studies of distance, blended, and online learning, teaching practices, student success and retention, as well as course and program design

(Garrison, Anderson & Archer, 2010; Garrison & Arbaugh, 2007; Halverson, Graham, Spring, & Drysdale, 2012; Rourke & Kanuka, 2009).

Few academic publications have generated the sustained level of interest and empirical investigation that the CoI framework has (Halverson, Graham, Spring, Drysdale, & Henrie, 2013). Halverson et al. (2013), in a thematic analysis of the most highly cited blended education scholarship published between 2000 and 2011, stated, "the Community of Inquiry framework seems to be one of the most utilized theories for blended learning at this time" (p. 24). The findings of this study provide substantial evidence that the model continues to be influential on many levels within the distance, blended, and online education community despite, or perhaps due to, the extraordinary technological innovation and copious distance education research that has occurred in the intervening 15 years.

Although the CoI model and its theoretical framework are clearly delineated in the seminal article that is the focus of this study, larger contextual factors of the framework are not. Concepts such as student characteristics, communication medium, engagement, interaction, content, learning goals, learning climate, learning direction, and discipline standards are suggested within and around the model; each of which has been the basis of much research by others. As Garrison and Arbaugh (2007) noted in their literature review of CoI-based research published prior to 2007, most of the studies focused on a single presence or individual concept of the framework, but not on the model itself. Despite numerous calls for more theoretical or holistic CoI framework-based research to better understand the interdependence and relationships between and among the three presences, and to establish the practicality of the CoI framework across

disciplines (Garrison & Arbaugh, 2007; Halverson, et al.,2013; Rourke & Kanuka, 2009), no systematic, comprehensive review of CoI-based empirical studies has been published to date.

There have, however, been two limited CoI-based syntheses conducted since the Garrison and Arbaugh review (2007), but both were restrictive in the selection of artifacts included in the respective syntheses (Befus, Cleveland-Innes, Garrison, Koole, & Vaughan, 2014; Rourke & Kanuka, 2009). Befus et al. (2014) restricted their synthesis to studies citing both the Garrison et al. (2000) seminal CoI article introducing the original framework and the Arbaugh et al. (2008) publication introducing the CoI survey; Rourke and Kanuka (2009) included only selected articles that focused on "deep, meaningful learning" (p. 43).

The Rourke and Kanuka (2009) literature review used the Ogawa and Malen (1991) strategy for synthesizing multi-vocal bodies of literature to review 252 selected research studies. Their purpose was to investigate deep and meaningful learning within communities of inquiry, and they concluded their review by recommending that others "conduct more, substantial investigations into the central construct of the popular framework for e-learning" (p. 19) in order to confirm or disclaim the CoI framework. However, concerns have been expressed about the Rourke and Kanuka review, including misrepresentation of the model in terms of learning outcomes, and criticisms that the literature included in the review was unfairly selective, i.e., that it excluded key CoI research studies and included other research studies with no relationship to the CoI framework (Akyol et al. 2009).

A comprehensive synthetic review of the CoI-related literature is clearly overdue. Reviews completed to date have been done either to identify gaps in existing research (Garrison & Arbaugh, 2007) or to investigate a particular aspect of the framework (Rourke & Kanuka, 2009). This study is the first to use a synthesis method to thematically explore a much broader and inclusive sample of artifacts belonging to the corpus of empirical CoI-based research.

Origins of the Community of Inquiry Framework

The Community of Inquiry framework was an outcome of a four-year Social Sciences and Humanities Research Council (SSHRC)-funded research project entitled "A Study of the Characteristics and Qualities of Text-Based Computer Conferencing for Educational Purposes," which ran from 1997 to 2001 (Community of Inquiry website, n.d.). In the resulting keystone paper, Garrison, Anderson, and Archer introduced the Community of Inquiry as a "conceptual framework that identifies the elements that are crucial prerequisites for a successful higher educational experience" (Garrison, Anderson, & Archer, 2000, p. 87). Although the CoI model is explained comprehensively by Garrison et al. (2000), the concepts, relationships, and processes that comprise the educational experience are complex.

Three supporting articles were subsequently published by the same authors (Anderson, Rourke, Garrison, & Archer, 2001; Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 1999) in order to "examine the individual elements in some detail, with particular attention to how these crucial components of the higher education experience can be maintained when higher education is moved into a CMC environment" (Garrison et al., 2000, p. 88).

Garrison et al. (2000) grounded the Community of Inquiry framework on Lipman's (1991) interpretation of a classroom Community of Inquiry, Dewey's (1933) concept of practical inquiry, and their own construct of teaching presence. Lipman (1993, 2003), in an analysis of classroom educational processes, defined a community of inquiry as a classroom in which "students listen to one another with respect, build on one another's ideas, challenge one another to supply reasons for otherwise unsupported opinions, assist each other in drawing inferences from what has been said, and seek to identify one another's assumptions" (p. 20). He attributed the origin of the term "community of inquiry" to the writings of philosopher Charles Sanders Peirce in 1873; however, Lipman (2003) argued that Peirce's concept of practitioners forming a community around the pursuit of identical scientific inquiry had since broadened to include non-scientific inquiry.

Statement of the Problem

The volume and diversity of the body of CoI-based research literature poses a daunting task for researchers and theorists seeking evidence of the veracity of the CoI framework and its applications. As explained above, and despite the continuing prolific publication of CoI-based empirical research articles, books, chapters, and conference presentations, no comprehensive research synthesis of CoI-based research has been published.

Historically, the number of citations of the seminal article (Garrison et al., 2000) has increased each year as demonstrated by a chronological analysis of Google Scholar citations (see Appendix A). The mounting volume of CoI-based research makes

collecting and comprehending the cumulative knowledge a daunting task, particularly for novice researchers.

Although the proliferation of online journals, databases, and archives, as well as search engines such as Google Scholar has facilitated scholarly literature searches on specific topics (Fink, 2013), there still exists no easy way to organize and assimilate the hundreds (and sometimes thousands) of articles on a particular topic that are dispersed far and wide in open-access and pay-protected digital repositories. In the absence of an up-to-date CoI research synthesis or compendium, researchers investigating the CoI framework must seek and construct their literature reviews individually, independently, and probably repetitively – a daunting and time-consuming task considering the quantity and diversity of CoI-related empirical research.

A premier online university, in conjunction with leading CoI researchers and practitioners, has recognized the importance of providing a centralized, online resource focused on CoI theory and has established an official Community of Inquiry website and online community. The CoI website (https://coi.athabascau.ca), established in 2012, is "designed to collect published research about the CoI and discuss these publications with interested researchers and practitioners" (CoI, nd). Currently the website houses a collection of CoI-related information, diagrams, surveys, and selected publications, and provides a venue for discussions; however, the collection is incomplete and static.

Theoretical Framework

Given the challenges associated with the volume and diversity of research referencing the CoI framework, a meta-analytic or meta-synthesis research methodology was adopted for this study as these synthesis methods offer the prospect of providing

order and insight into the corpus of CoI research. Sandelowski and Barroso (2006) define qualitative research synthesis as follows:

> A distinctive enterprise…that has features that overlap with other forms of inquiry, qualitative research synthesis. [It] is characterized by the a. systematic and comprehensive retrieval of all the relevant reports of completed qualitative studies in a target domain of empirical inquiry; b. systematic use of qualitative and quantitative methods to analyze these reports; c. analytic and interpretive emphasis on the findings in these reports; d. systematic and appropriately eclectic use of qualitative methods to integrate the findings in these reports; and e. use of reflexive accounting practices to optimize the validity of study procedures and outcomes (p. 1970).

In education, the concept of meta-synthesis – described as "finding the knowledge that lies untapped in completed research studies" – is credited to Glass (1976, p. 4), although the tradition of research summarization has long existed in philosophy, astronomy, statistics, and medicine (Chalmers, Hedges, & Cooper, 2002). The term "meta-analysis" is more often used to describe an aggregative multi-study analysis of quantitative research, rather than the synthesis of qualitative or mixed-methods research. Noblit and Hare (1988) are generally credited with the earliest description and application of meta-techniques to qualitative findings. Ogawa and Malen (1991) documented a heterogeneous synthesis methodology intended for reviews of multi-vocal literature, which they defined as "all accessible writings on a common, often contemporary topic" (p. 265), a definition that has subsequently been adopted by others for similar research (Ross & Ross, 2005; Rourke & Kanuka, 2009). A heterogeneous synthesis study

includes all types of empirical studies so is not restricted to one particular methodology but includes quantitative, qualitative and mixed-methods studies.

Researchers from several different fields including health and education have applied the methodology of thematic synthesis with the similar intent of describing and encapsulating salient research from a large body of literature (Attride-Stirling, 2001; Davies, Howell, & Petrie, 2010; Flemming, 2010; Kinn, Holgersen, Ekeland, & Davidson, 2013; Thomas & Harden, 2008). Halverson et al. (2012) and Halverson et al. (2013) applied thematic analysis to a body of heterogeneous blended learning literature to uncover the research methodologies, questions, and theoretical frameworks of the most highly-cited studies between 2000 and 2011. Likewise, Drysdale, Graham, Spring, and Halverson (2013) used a theoretical framework similar to the one used in this study to complete a heterogeneous study of blended learning dissertations and theses in order to document "the growth of blended learning research and demographic, methodological, and topical trends in that body of research" (p. 90).

Sandelowski, Voils, Leeman, and Crandell (2012) provided a comprehensive map of what they called "mixed methods–mixed research synthesis" (p. 318), which they categorized into two logics: aggregation and configuration. They used the term "logics" rather than "category" or "type" as one of the goals of their study was to chart when particular mixed methods synthesis research approaches were most effective as opposed to grouping methodologies with similar traits. They defined research synthesis by aggregation as "the assimilation of findings considered to address the same relationship or connection between two or more aspects of a target phenomenon" (p. 323) and research synthesis by configuration as "the arrangement of thematically diverse

individual findings, or sets of aggregated findings, into a coherent theoretical rendering" (p. 325). The heterogeneous synthesis methodology of this study fits under the research synthesis by configuration logic as it thematically arranges diverse individual studies into coherent, thematic configurations. Methods of heterogeneous mixed-methods syntheses are explored in more detail in Chapter 2.

Significance of the Study

For the broad community of distance, online, and blended education researchers, practitioners, administrators, and instructional designers, a heterogeneous thematic synthesis of empirical CoI research may facilitate the transfer of empirical research to applied practice. Barnett-Page and Thomas (2009) identify thematic synthesis as one of the methods most likely to "directly inform policy and practice" (p. 6). For the distance, online, and blended education research community, this thematic synthesis identifies areas of abundant and sparse research.

The database containing the 1,515 artifacts collected during this study is published online and is linked to the official Community of Inquiry website. The existence of this online database of CoI-related publication information facilitates assimilation of research knowledge for others by expediting queries of CoI literature as it contains publication information and thematic coding for a substantial portion of empirical research studies citing Garrison et al. (2000) published between 1999 and 2014. The database adheres to Canadian copyright and publication laws. Each item in the database is meta-tagged to enable sorting, searching, and querying, and the database itself serves as an exemplar for sharing research data as an open-access resource.

Research Questions

The central question this study sought to answer was:

What is the nature, focus, and context of empirical research that has been undertaken on the CoI framework since the publication of the Garrison et al. (2000) seminal paper?

Potential sub-questions are provided below; however, as data coding was performed using an inductive, iterative approach (Allan, 2003; Charmaz, 1990; Glaser, Strauss, & Strutzel, 1968), sub-questions and codes were not confirmed until data coding had concluded. [Note: the term "the study" in the sub-question examples shown below refers not to this study but to the empirical research artifacts that form the data for this research.]

- What is/are the educational setting of the study?
- What is the population addressed by the study?
- What research methodology or methodologies did the study incorporate?
- Which aspect of the CoI framework did the study investigate?
- What type of data were gathered?

To ensure the validity of this study, coding for themes was conducted in an emergent, iterative, and inclusive manner (Major & Savin-Baden, 2010). It was anticipated that sub-questions would also emerge in an iterative manner. Dixon-Woods et al. (2006) advocate employing an iterative approach for generating research questions and sub-questions; therefore, the sub-questions were modified in response to search results and coding. Eakin, and Mykhalovskiy (2003) elaborate upon this iterative

approach stating that "the research question functions more as a compass than as an anchor, and is sometimes not really known until the end of the research" (p. 190).

Scope of the Study

The scope of the study was restricted to empirical, peer-reviewed studies, citing the Garrison et al. (2000) keystone article, and published in English. Google Scholar was the primary search tool used to locate artifacts; however, the study also included substantial triangulation and comparison of results from a variety of other scholarly publishing sources. Many artifacts listed in Google Scholar were also found in other databases such as ERIC, EdIT, Science Direct, Gage, EBSCOHOST and others, as well as subscription-based and open online journals. A list of journals that have frequently published CoI-related research is included in Chapter 4 (See Table 9). Data collection was an iterative process and additional artifacts meeting study inclusion criteria that came to the attention of the researcher during the eight-month data collection period were included.

The term "artifact" used in this study refers to peer-reviewed, empirical research studies published in closed and open academic journals, academic peer-reviewed conference papers, masters thesis, doctoral dissertations, books, and book chapters.

It was estimated that the initial data set would consist of 650 artifacts, an estimate informed by the percentage of empirical studies found in a pilot study. Based on the findings of Befus et al. (2014) and a pilot study, it was further estimated that about half of those articles would not meet thematic synthesis parameters, reducing the number of articles to be included in the thematic synthesis to approximately 325 items. However, upon completion of Stage 1 data collection, the database contained 1,515 artifacts. Of the

1,515 artifacts collected, 910 artifacts were reviewed, and ultimately 329 were included in the thematic synthesis.

Artifacts that cited the seminal article once but did not base original research on CoI theory or concepts will be included in the database as others may benefit from knowing these articles exist; however, they will not be included in the thematic synthesis stage of this study. Complete details of study data collection and analysis processes are discussed in Chapter 3.

Terminology

There is little agreement on much of the terminology used in research synthesis studies. Therefore, the following definitions of terms are used in this dissertation:

Approach	A combination of the following dimensions: Qualitative or quantitative or mixed method; applied or basic; deductive or inductive methods.
Concept	Ideas expressed in models, expression of a particular phenomenon. Building blocks of a theory and evolved from ideas generated from direct experience. In this way they are less abstract and do not have the coherence of a framework, model or theory. (Garrison, 2000, p. 3-4)
Conceptual framework	A theoretical overview of intended research and order within that process (Lesham & Trafford, 2007, p. 96)
Data corpus	All data collected for a particular research project (Braun & Clark, 2006, p. 79)
Dataset	All data from a particular data corpus used for a particular analysis (Braun & Clark, 2006, p.79)
Literature review	The review of theoretical works and empirical studies pertinent to the specific issue addressed by a new study. (Cooper, 2010, p. 4)
Meta-analysis	Refers to the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings (Glass, 1976, p. 3)

Meta-synthesis	Theories, grand narratives, generalizations, or interpretive translations produced from the integration or comparison of findings from qualitative studies (Sandelowski et al., 1997, p. 365-366)
Multi-vocal literature	Multi-vocal literatures are comprised of all accessible writings on a common, often contemporary topic. The writings embody the view or voices of diverse sets of authors (academics, practitioners, journalists, policy centers, state offices of education, local school districts, independent research and development firms, and others). (Ogawa & Malen, 1991, p. 265).
Qualitative concept	Concept meanings are relative, based on opinion, value, tradition or culture
Quantitative concept	Concept meanings are absolute, based on quantifiable (measurable) fact
Research Method	Refers to the specific techniques employed in the study such as interviews, surveys or observation (Bogdam & Biklen, 2003, p. 31-32).
Research Methodology	Refers to the general logic and theoretical perspective of the research study (Bogdam & Biklen, 2003, p. 31-32).
Research Model	Map or guideline of research. A model is a less abstract form of a theory and represents structural relationships among the key concepts. It is a replica and often provides visual simplicity that can be grasped at a glance. (Garrison, 2000, p. 3-4)
Research Review	A generic term that implies reviewing research. Research review methods include integrative reviews, systematic reviews, meta-analyses, meta-synthesis and qualitative reviews.
Research Synthesis	Focuses on empirical studies and seeks to summarize past research by drawing overall conclusions from many separate investigations that address related or identical hypotheses (Cooper, 2010, p. 4)
Systematic Review	A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyze data from the studies that are included in the review. (Cochrane Collaboration, Glossary of Terms)
Thematic Analysis	A method for identifying, analysing and reporting patterns (themes) within data (Braun & Clarke, 2006)

Theoretical Framework	A theoretical framework represents a broad paradigmatic set of assumptions that provides the elements of the theory but without the detail and completeness (nuances) of a comprehensive theory. (Garrison, 2000, p. 3-4)
Theoretical Review	Presents theories offered to explain a particular phenomenon and to compare them in breadth, internal consistency, and the nature of their predictions (Cooper, 2010, p. 4)
Theory	A coherent and systematic ordering of ideas, concepts, and models with the purpose of constructing meaning to explain, interpret and shape practice. (Garrison, 2000, p. 3)

Outline of Dissertation

This dissertation consists of six chapters: Chapter 1, Introduction; Chapter 2, Literature Review; Chapter 3, Methodology; Chapter 4, Descriptive Findings; Chapter 5, Thematic Synthesis Findings; and Chapter 6, Conclusion.

Conclusion

This chapter described the purpose of the study, the research problem, and the research outcomes, namely a thematic synthesis of empirical CoI-based studies published between 2000 and 2014, and an open, online database of CoI-based empirical research. Conceptual assumptions and definitions were discussed, as was the rationale for selecting a heterogeneous, thematic synthesis theoretical framework. Chapter 1 also stated the main research questions and tentative sub-questions the synthesis might answer. The significance of this study, background of CoI theory and research, implications, and scope of the study were also addressed in Chapter 1. To provide further perspective to the study, Chapter 2 explores related literature in four areas: 1) background and significance of the Community of Inquiry framework; 2) research synthesis methods and justification;

3) previous CoI research syntheses; and 4) exemplars of other qualitative research synthesis studies.

CHAPTER 2 - LITERATURE REVIEW

This chapter includes reviews of germane literature in four areas: 1) background and significance of the Community of Inquiry framework; 2) research synthesis; 3) previous CoI research syntheses; and 4) exemplar qualitative research synthesis studies to provide perspective for the study.

The first section of this chapter focuses on influential literature providing background to the CoI framework and documenting the significance of the Garrison, et al. (2000) Community of Inquiry (CoI) framework as described in the seminal paper, "Critical inquiry in a text-based environment: Computer conferencing in higher education." As the focus of this study is a thematic synthesis of CoI research literature, the CoI literature in Chapter 2 is representative in order to provide background and context. The second section of this chapter examines and contrasts thematic research synthesis and meta-type research methodological models. Although the number of published qualitative research syntheses has been increasing steadily since 2000 (Tong, Flemming, McInnes, Oliver, & Craig, 2012), there are numerous approaches and no general agreement on terminology (Gough, Thomas & Oliver, 2012). This section of Chapter 2 examines several approaches, discusses terminology, and justifies the selection of the approach to be used in the study.

The third section of this chapter examines previously-conducted CoI research syntheses. Despite the enduring acceptance and widespread adoption of CoI theory and practice as evidenced by several hundred published research studies (see Appendix A), a comprehensive review of the entire corpus of the literature has not been conducted, underscoring the importance of this study for distance, blended, and online education

research. The fourth and final section of this chapter examines several examples of research synthesis completed in a distance education context.

Background and Significance of the CoI Framework

Despite its initial appearance in a printed and bound fledgling journal dedicated [at the time] to controversial educational research, the Garrison et al. (2000) paper has become the most frequently cited paper in the blended learning literature (Halverson et al, 2012). Since the publication of this seminal study, education scholars, researchers, practitioners, and students have embraced the Community of Inquiry framework and its three overlapping elements of social presence, teaching presence, and cognitive presence. Halverson et al. (2012) completed an extensive thematic analysis of the 50 most highly cited blended learning articles, the top 25 book chapters, the top 10 books, as well as the top 15 non-academic publications from 2000 through 2011. They concluded that Dr. D. Randy Garrison was the most influential author in the field and acclaimed the Community of Inquiry framework stating, "Garrison's critical work on community of inquiry has formed a theoretical backbone for much of blended and distance learning research" (p. 393).

The Community of Inquiry framework and its three overlapping presences are depicted as a Venn diagram in Figure 1 Diagram of Community of Inquiry Framework.

Figure 1. Diagram of Community of Inquiry Framework, Garrison et al. (2000), p. 88

The three overlapping circles represent the social, cognitive, and teaching presences and their relationships to each other; the phrases in the intersecting areas identify processes that might occur within the framework. In the words of Garrison et al. (2000), "The model of this Community of Inquiry assumes that learning occurs within the Community through the interaction of three core elements" (p. 88). The article includes a coding template that explains the element categories of the three presences, and provides examples of indicators that can be used to identify evidence of cognitive, social and teaching processes in text-based transcripts. Table 1 Community of Inquiry Coding Template is an exact replica of the Garrison, et al. (2000) original coding table.

Table 1

Community of Inquiry Coding Template, Garrison et al. (2000), p. 89

Community of Inquiry Coding Template

Elements	*Categories*	*Indicators (examples only)*
Cognitive Presence	Triggering Event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Applying new ideas
Social Presence	Emotional Expression	Emotions
	Open Communication	Risk-free expression
	Group Cohesion	
Teaching Presence	Instructional Management	Defining and initiating discussion topics
	Building Understanding	Sharing personal meaning
	Direct Instruction	Focusing discussion

The article includes the theoretical background for each of the three hypothesized elements or presences, and situates the context of the framework through a discussion of oral- and text-based communication theories, the influence of social-emotional well-being on learning, and the teaching role in an online classroom. The article continues by describing the processes used by the authors to justify the recommended text analysis units, and includes suggestions for coding protocols for analyzing online, text-based, asynchronous discussion forum messages in order to detect indicators of the presences. The authors conclude by stating, "The template is intended to guide research into the optimal use of computer conferencing as a medium for realizing educational goals in a distributed learning context" (p. 103).

The Garrison et al. (2000) article is the keystone paper of the CoI framework. Three supporting papers (Anderson, Rourke, Garrison, & Archer, 2001; Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 1999) were subsequently published to "examine the individual elements in some detail, with

particular attention on how these crucial components of the higher education experience can be maintained when higher education is moved into a CMC [computer mediated communication] environment" (Garrison et al., 2000, p. 88). The seminal article and the three supporting articles have inspired literally hundreds of other researchers, practitioners, and students to investigate the theoretical concepts contained within the CoI framework, apply them in pragmatic ways, and document their findings in empirical, peer-reviewed articles, books, book chapters, and conference presentations and proceedings.

A confounding issue associated with such a large and varied corpus of literature is that the body of literature is fragmented. A large percentage of the peer-reviewed articles are scattered widely in a variety of closed journals and databases making it challenging and time-consuming to obtain full-text versions; others are published in open, more accessible journals. Athabasca University hosts an online CoI community and article repository; however, at the time of writing, the repository contains only selected articles listed in a static, text-based format.

Although scholastic search engines such as Google Scholar facilitate broad and fairly reliable searches of published research literature including articles, theses and dissertations, conference presentations, and books across many disciplines and sources, acquiring and making sense of research studies numbering in the hundreds or thousands is a formidable task (Harzing, 2013). Furthermore, Google Scholar search results cannot be easily saved or manipulated.

Halverson et al. (2012) used Harzing's Publish or Perish software to identify the most frequently-cited publications on blended learning, published in English between

2000 and 2011. Using a sliding scale to account for publication date differences, they ranked D. R. Garrison as the most influential author by far in the blended learning field, and *Blended Learning in Higher Education: Framework, Principles, and Guidelines* (Garrison & Vaughan, 2008), which grounds practical learning activities and courses in the Community of Inquiry framework, as the second most influential book on blended learning for the same time period. Halverson et al. (2012) claimed that the Community of Inquiry framework was "one of the more widely [referenced] theoretical frameworks in distance education literature" (p. 391).

Although communication and educational technologies have changed in ways that were likely unimaginable to researchers Garrison, Anderson, and Archer in 2000, their pragmatic Community of Inquiry framework continues to be widely adopted by theorists, researchers, and educators seeking to comprehend influences on learning, particularly in distance, blended, and online applications. In 2001, the year following publication of the keystone paper, only four papers referenced the original article; however, in subsequent years, the number of citations increased progressively and dramatically (see Appendix A).

A Google Scholar search using the term "empirical" applied to the citation list of the 2,094 publications citing Garrison et al. (2000) published between January 2010 and September 2014 resulted in a subset of 802 publications. Using only the word "empirical" to identify this subset is, at best, a minimalistic parameter as it includes articles with the word "empirical" as a descriptive adjective (e.g., empirical evidence, empirical approach) and which might not be an actual empirical study; similarly, it could exclude actual empirical studies that use other terminology to describe the study (e.g.,

primary research). Nevertheless, the example is indicative of the approximate size of the CoI-based empirical research body of literature. Details and justification of the actual study search parameters used in this study are reported in Chapter 3.

When one compares the sparse environment of computer-mediated conferencing (CMC) forums of the late 20th century with the diversity of Web 2.0 communication resources available in 2015, it is noteworthy that researchers and practitioners continue to find the Garrison et al. (2000) article relevant and applicable in today's technology-rich online learning environments (O'Reilly, T., 2007). Moreover, use of the CoI framework is not limited to empirical research. Educational institutions are designing courses and entire programs based on the Community of Inquiry framework and its associated three presences. For example, Semingson and White (2012) reported results obtained from a blended course designed using the Community of Inquiry framework to provide "an intentional and purposeful way to design and facilitate computer-mediated-communication to support learning that takes place in a mainly face-to-face environment" (p. 2096-2097). The study involved 40 teacher candidates enrolled in an on-site, undergraduate, pre-service, elementary teaching certification program, who were within one to two years of graduation. Not only was the program designed using the CoI framework, the students in the program, future teachers, were experiencing the CoI framework as a mechanism for their learning. The program design included guided video-based discussions incorporating YouTube videos, student blogs, and a small online survey, yet Semingson and White (2012) determined the primarily text-based CoI framework to be the most relevant framework for their purposes. These authors found that guided video-based discussions were effective in developing a community of inquiry

and that students engaged in metacognitive reflection on the usefulness of incorporating CoI in their own future learning and teaching practice.

Researchers, instructional designers, learning strategists, and practitioners have found the CoI framework to be a pragmatic and valid tool upon which to structure rich online and blended courses and empirical studies (Clark, Strudler, & Grove, 2013; Van der Merwe, 2012; Zhan & Mei, 2013). Van der Merwe (2012) not only based an empirical study on the CoI framework, he also designed a software application that functioned as a CoI coding tool allowing an instructor to "systematically and economically code ODF [online discussion forum] discourse *in situ* and in context" (p. 5) as the course progressed, enabling an instructor to determine presences as they appeared or receded in the course and to respond accordingly.

Another indicator of the influence the CoI framework has had in distance education, is that the second and third editions of the *Handbook of Distance Education* (Moore, 2007 & 2013) include the Community of Inquiry framework as a separate chapter in "Part 1: Historical and Conceptual Foundations" as one of "the four main theories that have evolved during that history" (Moore, 2013, p.1).

Although numerous models elucidating learning processes in blended educational environments have been postulated, the Garrison, Anderson, and Archer (2000) framework remains the most referenced article in blended and online learning studies. Halverson et al. (2013) conducted a thematic analysis of 60 articles and 25 book chapters of most influential blended learning studies and found that the CoI framework was the only theoretical framework cited more than once. They identified 17 separate and unique

online learning theories or models posited in the years between 2000 and 2012 including, but not limited to, the following:

- Community of Inquiry (Garrison et al., 2000)
- Badrul Khan's octagonal framework (Singh, 2003)
- Sloan-C's 5 pillars of online learning (Bourne, Harris, & Mayadas, 2005)
- The 3C-model of didactical components (Kerres & DeWitt, 2003);
- Blended learning systems structure (BLESS) model (Derntl & Motschnig-Pitrik, 2005);
- ADAPT (active discovery and participation through technology) model (Tuckman, 2002);
- HELAM (hexagonal e-learning assessment model) (Ozkan & Koseler, 2009);
- Biggs' presage-process-product (3P) model of student learning (Bliuc, Ellis, Goodyear, & Piggott, 2010);
- Berge's framework for investigating the pedagogical, social, managerial and technological roles adopted by online and blended instructors (Kaleta, Skibba, & Joosten, 2007);
- Rogers' innovation-decision process (Kaleta, Skibba, & Joosten, 2007);
- Graham's dimensions of interaction (2006) (Halverson et al., 2013, pp. 23-24).

The diverse list above illustrates the innovation and interest that the Internet and educational technology excited in educators in the first decade of the 21st century. Hence, the success and widespread adoption of the Community of Inquiry framework is

intriguing considering its unassuming beginnings and its popularity over the other numerous educational models and frameworks that emerged during the same time period.

Research Synthesis

While all research involves synthesis at some level, there are two broad main categories: 1) synthesis of primary research findings; and 2) synthesis in a field of study. Primary research or studies involve a researcher gathering original data from a particular population through a variety of methods such as surveys, interviews, focus groups or observation, then synthesizing the gathered data in order to reach conclusions or report answers to research hypotheses. On the other hand, synthesis in a field of study involves gathering a quantity of primary research studies, and then aggregating, summarizing or configuring the data "from a body of studies into a new whole" (Major & Savin-Baden, 2010, p. 177).

Synthesis of literature is different from a traditional scholarly literature review. Literature reviews generally consist of an overview of selected literature to ascertain the current state of knowledge on a given topic in order to identify new areas of research. A literature review can be defined as "a summary of a subject field that supports the identification of specific research questions" (Rowley & Slack, 2004, p. 31), and often involves comparing and contrasting studies, analysing methodologies, and/or exploring theories to prepare for an original study on a topic or area that has not yet been researched. On the other hand, a research synthesis attempts to aggregate or configure existing empirical research probing for generalizations or insights by combining separate studies into a more inclusive whole.

Savin-Baden and Major (2010) state that the purpose of synthesis in a field of study is "to make sense of concepts, categories or themes that have recurred across a particular data set in order to develop a comprehensive picture of the findings" (p. 108). Some of the more commonly-used terms to describe synthesis are meta-analysis, systematic review, meta-ethnography, meta-synthesis, and interpretive review. While there seems to be little agreement on definitive terms and phrases that are often used interchangeably to describe synthesis of research of all types, there is agreement on the importance of aggregating and interpreting primary research or "research of research" (Barnett-Page & Thomas, 2009; Gough et al., 2012).

The origins of these various terms may reflect the evolution of different types of research synthesis. Glass (1976) is generally credited with coining the term "meta-analysis" and defining the process associated with statistical meta-analysis; however, the concept of aggregating and summarizing research findings has roots in 18th century medicine, physics, and astronomy (Chalmers, Hedges & Cooper, 2002). To some, the term meta-analysis is synonymous with statistical analysis of aggregated quantitative research studies (Cooper, 2009; Rosenthal & DiMatteo, 2002).

Noblit and Hare (1988) are most often credited as the originators of the term "meta-ethnography," introducing the term and concept of qualitative synthesis in one of the first publications defining an interpretive approach for synthesizing qualitative studies. Terms often used to describe synthesis of qualitative research include qualitative research synthesis (QRS) (Sandelowski, Docherty, & Emden, 1997), meta-summary (Sandelowski & Barroso, 2007), meta-study (Paterson & Canam, 2001), and grounded theory approaches (Glaser, Strauss, & Strutzel, 1968). Qualitative research synthesis is

described by Thorne, Jensen, Kearney, Noblit, and Sandelowski (2004) as "developing new knowledge based on rigorous analysis of existing qualitative research findings" (p. 2). According to Sandelowski, Docherty, and Emden (1997), the phrase "qualitative research synthesis" can refer to either the interpretative product of a synthesis or the process of producing such a synthesis. Kinn et al. (2013) point out that a range of different modes of synthesizing qualitative research has emerged, further confounding clarity in research synthesis terminology.

The number of health-related qualitative research syntheses of large bodies of literature increased exponentially between 2000 and 2010 (Tong et al., 2012), as depicted in Figure 2 below.

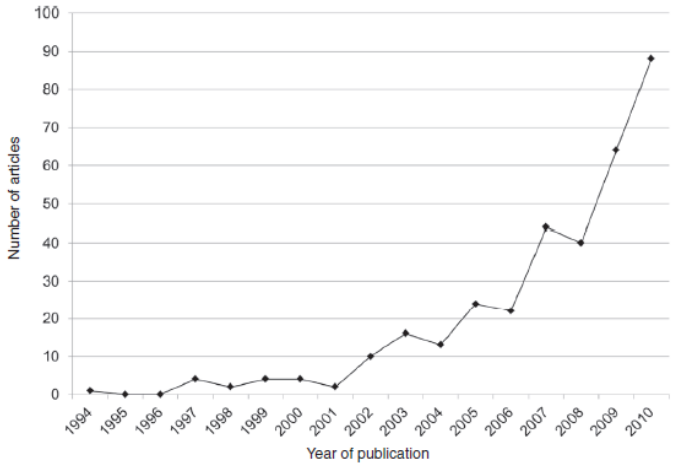

Figure 2. Number of Published Qualitative Health Research Syntheses (Tong et al., 2012, p. 2)

Although Tong et al. (2012) do not suggest reasons for the sharp increase in the number of syntheses between 2001 and 2010, it seems reasonable that the Internet, digital documents, and digital technological advancements in research and publishing during that decade played a significant role. Digitization of academic journals and databases, in

concert with the communication and dissemination affordances provided by the Internet, development of scholastic search engines such as Google Scholar, and improvements to research software programs have increased the feasibility of locating, gathering, and analysing the documents that form the data for research synthesis .

Tong et al. (2012) state, "There are a wide range of qualitative synthesis methods with many common features, but also key differences" (p. 1). They identified five primary qualitative synthesis methods including meta-ethnography, thematic synthesis, critical interpretive synthesis, narrative synthesis, and meta-study, and then defined each in terms of its philosophical positioning, type of literature search conducted, type of quality appraisal applied to literature items, analysis techniques and concepts, synthesis output complete with seminal authors, and examples of published syntheses. Although this present study was not of an ethnographic nature, meta-ethnography and thematic synthesis interpretative concepts and philosophies were influential in choosing the research framework.

Thomas and Harden (2008) published a synthesis methodology that they termed "thematic synthesis" (p. 2), which combined and adapted approaches from both meta-ethnography and grounded theory. The method was developed to conduct reviews of qualitative research in order to address questions relating to intervention need, appropriateness, and acceptability of nutrition education for children. Lucas et al. (2007) maintain that one of the strengths of a thematic synthesis is the possibility of discovering conclusions based on common elements across heterogeneous studies, that is, studies with similar purposes that have employed different methodologies and analysis.

Goals of Research Synthesis

The principal goal of research synthesis is to establish a "new, integrated, and more complete interpretation of findings that offers greater understanding in depth and breadth than the findings from individual studies" (Bondas & Hall, 2007, p. 115). Jackson (1980) identified four primary reasons to conduct research synthesis: 1) evaluate new developments in a given field; 2) verify existing theories or develop theory; 3) synthesize knowledge from different lines or fields of research; and 4) infer generalizations about substantive issues from a set of studies directly bearing on those issues. Cooper (1988) corroborated Jackson's (1980) goals, expanding on the fourth reason by more clearly articulating how research synthesis could contribute to the state of knowledge on a given topic by highlighting important issues that had been omitted from research on the topic, revealing papers that may have become obscure, and directing future research.

Gough et al. (2012) contend that the nature of the research question should be a major determinant for the type of synthesis conducted. They provide examples for several common types of research questions including "What is the effect of…?" "What is the accuracy of …?" "What is the meaning or process of [this] phenomena?" and "What are the attributes of this intervention or activity?" (pp. 2-3). This study seeks to explore the nature, focus, and context of empirical research that has been undertaken on the CoI framework since the publication of the Garrison et al. (2000) seminal paper by seeking to answer secondary questions such as the following: "What is the focus of empirical CoI-based research?" "In what contexts has the CoI framework been applied most and least often?" "Which CoI presence has been researched the most?" "Which CoI

presence has been researched the least?" "Has the CoI framework influenced online teacher education programs?"

Major and Savin-Baden (2010) offer compelling, yet sage, arguments in favour of qualitative research synthesis. They posit that qualitative research synthesis offers the following benefits: a) renders knowledge more comprehensible to others; b) helps manage overwhelming volumes of information; c) helps address knowledge fragmentation; d) may identify research gaps and omissions; e) provides an alternate perspective to quantitative approaches; f) provides ways to advance theory; g) sparks debate and dialogue; h) provides a broader picture; i) facilitates evidence-based practice and policy; and j) defrays costs by optimizing findings and reducing research duplication.

As several other writers point out (Noblit & Hare, 1988; Sandelowski, 1997; Suri & Clarke, 2009), results from a single primary study rarely provide definitive or generalizable answers to research questions. Research syntheses should aim to answer specific questions, rather than present general summaries of the literature on a topic of interest. Aromataris and Pearson (2014) advise, "A systematic review does not seek to create new knowledge but rather to synthesize and summarize existing knowledge, and therefore relevant research must already exist on the topic" (p. 55).

On the other hand, critics of qualitative research synthesis argue that valuable qualitative research context may be lost in syntheses. Moreover, synthesists are limited to studying research that is published and fits within the parameters of the study; as such, synthesists must rely on study design and research questions that the original researchers have stated. Often synthesists have access to published findings only, not to original transcripts or primary data (Bondas, & Hall, 2007). Other criticisms of qualitative

research synthesis include researcher bias, lack of rigour, too few studies to yield generalizability or transferability, devaluation of original research, and breach of copyright law or institutional ethic authorisations. However, as Sandelowski et al. (1997) state, "Qualitative meta[-]synthesis is not a trivial pursuit, but rather a complex exercise in interpretation: carefully peeling away the surface layers of studies to find their hearts and souls in a way that does the least damage to them" (p. 370). With care and sound methodology, a synthesis may yield valuable information that individual studies alone cannot.

Research Synthesis Methods

In 2009, Barnett-Page and Thomas published an article distinguishing amongst a number of qualitative research synthesis methods in order to suggest considerations that might be applied when selecting a synthesis method. They compared and contrasted characteristics of nine synthesis methods across a range of dimensions including epistemology, research approach, iterative nature, problematizing of primary study literature, degree of "going beyond" the primary studies or seeking a fresh interpretation of the phenomena under review, the synthetic product or study outcomes, and the heterogeneity of primary study artifact methodology.

The nine synthesis methods analyzed by Barnett-Page and Thomas (2009) included the following:

1. Meta-narrative (Greenhalgh, Robert, Macfarlane, Bate, Kyriakidou, & Peacock, 2005)
2. Critical interpretive synthesis (CIS) (Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005)

3. Meta-ethnography (Noblit & Hare, 1988)
4. Meta-study (Paterson & Canam, 2001)
5. Grounded theory (Glaser & Strauss, 2009)
6. Thematic synthesis (Thomas & Harden, 2008)
7. Textual narrative synthesis (Lucas, Baird, Arai, Law, & Roberts, 2007)
8. Framework synthesis (Brunton, Oliver, Oliver & Lorenc, 2006)
9. Ecological triangulation (Banning, Cobb, & Wolgemuth, 2001).

Sandelowski et al. (1997) defined three kinds of synthesis: a) integration of findings from multiple analytic paths by one investigator; b) synthesis of findings across studies conducted by different investigators; and c) use of quantitative methods to aggregate qualitative findings from cases across different studies. Others have grouped research synthesis methods into aggregation and interpretation categories. Gough et al. (2012) use the terms "aggregative" and "configurative," stating that "aggregative research tends to be about seeking evidence to inform decisions whilst configuring research is seeking concepts to provide enlightenment through new ways of understanding" (p. 3).

Synthesis methods such as meta-analysis (Glass, 1976) and systematic reviews (Higgins, 2011) fall into the aggregation category, which requires that the studies included in the synthesis have identical (or nearly identical) research methodology and data collection procedures. These types of research synthesis have rigourous protocol and *a priori* requirements, and their main aim is to widen and increase the sample size to test a common hypothesis. On the other hand, interpretive synthesis methods such as meta-ethnography (Noblit & Hare, 1988), grounded theory (Glaser & Strauss, 2009),

thematic synthesis (Thomas & Harden, 2008), meta-study (Paterson et al., 2001), and critical interpretive synthesis (Dixon-Woods et al., 2006) seek to "push beyond the original data to a fresh interpretation of the phenomena under review" (Barnett-Page & Thomas, 2009, p. 8).

Many synthesis methods include similar phases (Cooper, 1982; Dixon-Woods et al., 2006; Major & Savin-Baden, 2010):

- Define a research question (problem formation);
- Search the literature (data collection);
- Assess the studies (data evaluation);
- Analyze and interpret the results;
- Write up and present findings.

Sandelowski et al. (1997) state,

> No matter what method is used, the aim of qualitative metasynthesis is to account for all important similarities and differences in language, concepts, images, and other ideas around a target experience. In contrast to quantitative metaanalysis, qualitative metasynthesis is not about averaging or reducing findings to a "common metric" (Wolf, 1986, p. 33), but rather enlarging the interpretive possibilities of findings and constructing larger narratives or general theories (p. 369).

Previous CoI Research Syntheses and Reviews

Research based upon the Community of Inquiry framework has been subjected to some review, the first published in 2007. Garrison and Arbaugh (2007) completed a literature review of CoI framework-based research in order to identify emerging issues

and suggest possible research directions. They reported at that time that the seminal Garrison et al. (2000) publication had 225 Google Scholar citations. The Garrison and Arbaugh (2007) study was not a research synthesis, but a more traditional literature review that concluded by calling for more quantitative and cross-disciplinary studies.

In a research synthesis focused on the Garrison et al. (2000) seminal paper, Rourke and Kanuka (2009) identified 252 reports from 2000 to 2008 and reviewed them using Ogawa and Malen's (1991) strategy for synthesizing multi-vocal bodies of literature. The stated purpose of the Rourke and Kanuka (2009) study was to determine if researchers had been able to prove deep learning through use of the Community of Inquiry framework. Rourke and Kanuka found that only five of the 252 reviewed studies actually measured student learning, leading them to conclude, "the CoI fails as a model for achieving deep meaningful learning because the procedures for achieving those outcomes do not materialize" (p. 43). Akyol et al. (2009) responded to the Rourke and Kanuka (2009) review in the next volume of the journal, supporting some statements and clarifying, disproving, and countering others. In doing so, they initiated a scholarly debate and possibly attracted more attention to the fledgling theory.

Although several hundred more studies have cited the Garrison et al. (2000) article since Rourke and Kanuka published their synthesis in 2009, searches of the literature to August 2014 did not expose any further published reviews or synthesis research on the corpus of Community of Inquiry framework research. Befus, Cleveland-Innes, Garrison, Koole, and Stenbom (2014) recently presented preliminary results of an applied meta-analysis of 73 CoI studies, but looked solely at quantitative and mixed-

methods studies based on the Garrison et al. (2000) seminal article and the Arbaugh et al. (2008) Community of Inquiry survey instrument.

In 2008, a group of researchers from several higher education institutions in Canada and the United States developed and validated a survey instrument to empirically test the CoI framework and to provide a tool by which others might conduct quantitative empirical studies based on the entire framework. Publication of the CoI survey instrument was also intended to assist researchers wishing to examine the relationship of the CoI framework to variables such as course outcomes. Prior to the development of the CoI survey instrument, CoI-based research was predominantly qualitative in nature and focused on individual presences rather than the entire framework (Arbaugh et al., 2008).

However, much CoI research has been conducted using alternate methods or instruments, so the reviews mentioned above may have overlooked significant segments of the research. This study addressed this gap by assembling a substantial collection of heterogeneous CoI-based empirical studies published between 1999 and 2014, and conducting a thematic synthesis of these artifacts.

Exemplars of Research Syntheses

The purpose of the fourth and final section of this literature review is to examine published research syntheses that have been conducted on distance education topics. To complete this section of the literature review, a search of Google Scholar using the phrase "qualitative research synthesis" and then "distance education" was conducted. This search resulted a list of 10 publications: eight journal articles and two books published between 2007 and 2013. Full-text copies of six of the articles were obtained and analyzed from the perspective of the synthetic purpose, data of interest, data acquisition,

data validation, research question(s), methods, and findings. The following six studies were included in this review: Bair and Haworth (2005); Blackmon (2012); Blackmon and Major (2012); Major and Savin-Baden (2011); McGee and Reis (2012); and Tong et al. (2012). Table 2 provides a summary of these synthesis exemplars.

Table 2

Summary of Distance Education-Based Research Syntheses Exemplars

Author(s)	Year	Question or Purpose	Synthesis Method	No. of Studies	Data Collection	Data Analysis
Bair & Haworth	2005	What factors make a difference in a student persisting or dropping out of a doctoral program?	Meta-synthesis	118	Articles, books, dissertations, conference pres. Reports, thesis & unpublished studies	Not given
Blackmon & Major	2012	How do students describe their online learning experiences?	Qual. Research synth. Major & Savin-Baden	10	ERIC, Academic Elite & Google Scholar	Location and deconstruction of findings
Blackmon S. J.	2012	Gather student outcomes data from online chat & discussion boards	"Research synthesis" no other specifics given	11	ERIC search	Charts, article credibility, article comparison, findings, themes
Major & Savin-Baden	2011	Review of published qual. research synthesis in higher ed.	Cross-case comparison	177	Search Academic Elite, ERIC, Prof. Dev. Collection, vocation & career, Cochrane database	Matrix developed to evaluate quality
McGee & Reis	2012	Determine commonality in blended course design:	Qualitative meta-analysis	not stated	Subscription-based and open journals searched ProQuest, ERIC and Dir. Of Open Access Journals	Not given
Tong et al.	2012	Develop a framework for reporting synthesis of qualitative health research.	Thematic Synthesis	381	Electronic medical literature databases including MEDLINE, EMBASE, CINAHL and Google Scholar.	ENTREQ statement (Proforma) consists of 21 items grouped into 5 categories

The number of studies included in each synthesis varied considerably, ranging from a low of 10 to a high of 381 studies, with one synthesis not reporting how many studies were included. Each exemplar was examined to determine the context and purpose for the synthesis, the research question(s), synthesis method or research framework, data collection procedures, analysis method, methods for establishing study validity, and study results.

The stated purpose for the syntheses varied from determining commonality in blended course design and looking for patterns of best practices in blended learning (McGee & Reis, 2012), to gathering data on the influence of online chat and discussions on student outcomes through the lens of Moore's transactional distance theory (Blackmon, 2012), to retention in doctoral programs (Bair & Haworth, 2005), and to self-reported student online learning experiences (Blackmon & Major, 2012). Tong et al. (2012) reviewed 381 research syntheses with the intent of developing a framework for ensuring and assessing rigour and transparency in qualitative research synthesis. Major and Savin-Baden (2011) also conducted a synthesis of syntheses or, using their terminology, a "review and categorization of research synthesis" (p. 648) in which they reviewed 177 qualitative research synthesis studies published between 1983 and 2010 in order to find answers to the following questions:

1. Which terms are most frequently used to describe common processes?
2. How might these approaches best be categorized?
3. What are common features and elements of various approaches?
4. What constitutes methodological rigor, and documentation of such, in this field?

All six syntheses used published empirical research studies as data; however, the stated synthesis method description varied from "qualitative meta-analysis" (McGee & Reis, 2012), to "meta-synthesis" (Bair & Haworth, 2005), to "qualitative research synthesis" (Blackmon and Major, 2012). One of the studies did not identify a specific methodological framework, stating simply use of a research synthesis method but supplying no further details. The Major and Savin-Badin (2011) synthesis provided rich,

detailed information in a meta-cognitive manner describing their processes using examples from some of the syntheses included in their review. The results and recommendations from the Major and Savin-Badin (2011) review were provided in a comparative table including recommendations for application of synthesis methods, purpose, sampling, data of interest, study appraisal criteria, number of studies included, data analysis, representations of findings, and presentation of findings.

Tong et al. (2012) also conducted a synthesis of synthesis methods, analysing 381 published qualitative syntheses from which they developed a detailed, comprehensive framework aimed at improving synthesis processes and reporting. Their qualitative research framework consisted of 21 elements grouped into five domains: introduction; methods and methodology; literature search and selection; appraisal; and synthesis of findings. Both the Major and Savin-Badin (2011) and the Tong et al. (2012) research syntheses were influential in the development of this present study as they provided rich detail and examples of useful forms and matrixes, as well as contrasts and comparisons of contemporary synthesis methods.

CoI Research Synthesis

The quantity of articles, books, dissertations, presentations, and reviews that make up the Community of Inquiry framework-related body of literature is substantial, but much of the hard-won knowledge remains silent or too fragmented to be of pragmatic use to educational practitioners and administrators or educators outside of academia. Hence a heterogeneous research synthesis using a thematic synthesis approach (Thomas & Harden, 2008) was adopted for this study on the extensive body of knowledge that has accumulated around the Community of Inquiry framework.

This study contributes to the existing knowledge of research synthesis using the affordances offered by technological advancements in order to help understand the scope and direction of a significant body of educational research, namely the corpus of research literature surrounding the Community of Inquiry framework (Garrison et al., 2000)

Conclusion

Prominent qualitative research synthesists such as Major, Savin-Baden, Sandelowski, Kinn, and Holgerson maintain that synthesis is a critical approach for giving meaning to isolated facts, reconciling seemingly diverse results, and interpreting knowledge in such a way that it becomes pragmatic for practitioners and policy makers. A rigourous, methodologically sound thematic research synthesis study can fill a void in a body of literature and may provide insights that individual studies cannot. The results of this study may help inform direction for those championing the CoI and for future CoI researchers.

This literature review has endeavoured to convey the impact the Garrison et al. (2000) publication, "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education," has had on distance, online and blended learning communities thus far, and the benefit that synthesizing this body of literature will have in informing future research and action for the framework. The chapter reviewed literature in four pertinent areas: 1) the background and significance of the Community of Inquiry framework; 2) research synthesis; 3) previous CoI research syntheses; and 4) exemplar qualitative research syntheses.

Chapter 3, presents the methodology and procedures used to complete this research study. Data gathering, quality assessment, coding, and analysis methods for this

thematic synthesis are discussed in the next chapter as are ethical considerations, researcher bias, study feasibility, limitations and delimitations, and study outcomes.

CHAPTER 3 - METHODOLOGY

Introduction

This study is a heterogeneous thematic synthesis of a corpus of literature comprised of full-text empirical research study artifacts. The generic term "artifact" has been used throughout this present study to denote each journal article, book, book chapter, thesis, or conference paper that comprise the sample for this study. The first section of this chapter describes the protocol used to identify, collect, and analyze artifacts using a framework that has been applied in similar studies by other researchers (Attride-Stirling, 2001; Braun & Clarke, 2006; Ogawa & Malen, 1991; Thomas & Harden, 2008; Tong et al., 2012). The second section provides a detailed description of the artifact quality assessment and cataloguing methods. The third section documents the thematic synthesis analysis processes. Sections delineating ethical considerations, researcher bias, study feasibility, limitations and delimitations, and study outcomes conclude the chapter.

Thematic synthesis is an effective method for identifying, analysing, and reporting patterns or themes within a large, diverse body of literature as the methodology is flexible and relatively easy to learn and do. Thematic syntheses can result in worthwhile reports suitable for informing policy development, usefully summarizing key features of a large body of data, highlighting similarities and differences across a data set, and generating unanticipated insights (Attride-Stirling, 2001; Braun & Clarke, 2006; Dixon-Woods et al., 2006; Heyvaert, Maes, & Onghena, 2013; Ogawa & Malen,1991; Thomas & Harden, 2008).

A comparison of thematic synthesis frameworks advocated by five groups of researchers (Attride-Stirling, 2001; Braun & Clarke, 2006; Ogawa & Malen, 1991; Thomas & Harden, 2008; Tong et al., 2012), all of whom have conducted qualitative or heterogeneous mixed methods thematic analyses, reveals that all five groups incorporated similar concepts and stages in their work although the terminology and number of stages and steps vary considerably. Attride-Stirling (2001) provides the most succinct, yet informative, model for a thematic synthesis study. Her three-stage, six-step thematic networks framework is displayed below in Table 3.

Table 3

Model of Thematic Networks Framework

Analysis Stage A: Reduction or Breakdown of Text	
Step 1. Code Material	(a) Devise a coding framework (b) Dissect text into text segments using the coding framework
Step 2. Identify Themes	(a) Abstract themes from coded text segments (b) Refine themes
Step 3. Construct Thematic Networks	(a) Arrange themes (b) Select Basic Themes (c) Rearrange into Organizing Themes (d) Deduce Global Theme(s) (e) Illustrate as thematic network(s) (f) Verify and refine the network(s)
Analysis Stage B: Exploration of Text	
Step 4. Describe and Explore Thematic Networks	(a) Describe the network (b) Explore the network
Step 5. Summarize Thematic Networks	
Analysis Stage C: Integration of Exploration	
Step 6. Interpret Patterns	

Note. Reprinted from "Thematic networks: An analytic tool for qualitative research" by J. Attride-Stirling, 2001, Qualitative Research, 1(3), Box 1, p. 391. Copyright by SAGE Publications (London, Thousand Oaks, CA, and New Delhi)

It is noteworthy that only two of the five studies mentioned above included details of artifact acquisition within their methodological framework; the other three studies focused solely on describing and providing examples of thematic synthesis methods with little or no mention of document acquisition processes. Thomas and Harden (2008) and Tong et al. (2012) are the only two studies that included study acquisition search strategy, quality assessment, and text extraction protocol recommendations as part of their

methodologies. Tong et al. (2012), in particular, provides useful detail for conducting digital document acquisition and analysis using computer software, due perhaps to the fact that their research was published in the digital era; the others, published between 1991 and 2006, may have relied on pre-digital, paper-based, analog document acquisition and analysis procedures.

Study Outline and Procedures

The thematic synthesis for this study employed a unique framework with similarities to the Attride-Stirling (2001) and Tong et al (2012) models. The study framework, comprised of three stages and ten steps, is described below.

The study data consisted entirely of peer-reviewed, empirical publications including journal articles, book chapters, books, conference papers, theses, and dissertations. While it was anticipated that the data would consist primarily of peer-reviewed journal articles, theses, and dissertations, other types of empirical research publications were examined early in the study provided they cited the Garrison et al. (2000) seminal article, reported results from primary studies, and were peer-reviewed. Table 4 below provides a summary outline of the three stages and ten steps of this study.

Table 4

Study Methodology Outline

Stage		
1	Literature Search and Acquisition	
	Step	
	1	Data identification
	2	Data acquisition
2	Artifact Appraisal	
	3	Data inclusion
	4	Artifact assessment and quantification
	5	Study characteristic appraisal
3	Thematic Coding and Analysis	
	6	Data export
	7	Artifact descriptive analysis
	8	Identification of basic themes
	9	Identification of organizing themes
	10	Identification of global themes

Stage 1 – Literature Search and Acquisition Procedure

Step 1 Data identification.

Google Scholar was used as the initial source for identifying CoI research studies. A Google Scholar search using the parameter "Garrison, Anderson, Archer, Critical inquiry in a text-based environment: Computer conferencing in higher education" was performed. Then, a secondary Google Scholar search of the citation list for the seminal article was applied with additional parameters for year published and Boolean search strings to filter for empirical, case study or primary research. Separate search result lists for each year from 2000 through 2014 were sorted into relevance order as determined by

Google Scholar, digitized, saved, and printed. Similar search procedures were conducted in other academic databases, namely ProQuest, ERIC, EdIT, Science Direct, Gage, and EBSOHOST as well as leading scholarly journals such as Computers & Education, Internet and Higher Education, International Review of Research in Open and Distance Learning and the Journal of Asynchronous Learning Networks. Cross-tabulation of search results was completed, the results of which are reported in Chapter 4.

Data organization.

A system of chronologically organized sub-collection folders was established so that each data subset contained three folders: a master folder that contained all artifacts gathered for that specific year, an "included" folder containing artifacts meeting thematic synthesis criteria and an "excluded" folder containing all other artifacts. This chronological system proved to be very advantageous in subsequent stages of this study. Figure 3 Subset Folder Organization Illustration provides a visual depiction of this data organization system.

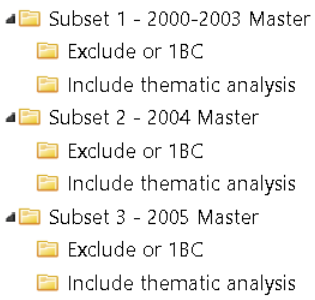

Figure 3. Database Subset Folder Organization Illustration

An iterative data inclusion process was employed, and up to the completion of Stage 2, items that met data collection criteria were retroactively added to the database as they were identified. Google Scholar alerts were created to notify the researcher of the

availability of newly catalogued artifacts. The database was regularly backed up to a secure, off-line hard-drive.

Step 2 Data acquisition.

The printed lists prepared in Step 1 were used to guide acquisition, tagging and cataloguing of full-text, digital copies of all artifacts. Zotero reference management software, in conjunction with Google Scholar, was the primary artifact acquisition tool and was used to retrieve, tag, and store artifact bibliographic information, abstracts, and in many cases, download full-text files. Zotero automated much of the process of acquiring artifact reference information such as artifact type, author, title, and publication details as these characteristics were obtained from each publication's meta-data. The Zotero software also facilitated document organizing, tagging (coding), sorting, searching, and memoing, rendering it a key research tool for this study.

If artifacts were published openly, full-text versions of the digital file were easily downloaded and linked directly to the artifact record in the database. Access to full-text files for artifacts published in protected journal or database collections was obtained utilizing a semi-automatic process facilitated by Zotero and subscription access through the researcher's academic institution. If a full-text copy of an artifact was not available to the researcher despite reasonable efforts to obtain it, publication information was retained in the database to inform others, but artifact itself was excluded from the thematic synthesis.

Stage 2 – Artifact Appraisal

Step 3 Data inclusion.

The title and abstract of each artifact were examined in order to determine the publication type, and to make an initial decision whether or not the artifact met first-round study inclusion criteria. Searching in multiple databases and journals as described in Stage 1, Steps 1 and 2, resulted in some duplicate records as well as inclusion of non-empirical or non peer-reviewed artifacts. The Zotero duplicate identification tool was used to locate and remove duplicates from the database. Non-empirical and non peer-reviewed studies were identified manually and digitally memoed accordingly but retained in the database to inform other researchers.

As thematic study inclusion criteria was applied to artifacts in Stage 2, each item was copied to either the "excluded" or "included" subfolder within each year's collection. A comprehensive process chart was created in order to track study progress, enable cross-check functionality and reinforce study consistency and rigour. (See Appendix B)

Step 4 Artifact assessment and quantification.

Before beginning active research, it had been planned that each item in the dataset would be categorized into one of seven level of evidence categories, based on examples of level-of-evidence scales recommended by the Cochrane Collection (Cesario, Morin, & Santa-Donato, 2002; Howick, 2013). The levels of evidence for this study are described below in Table 5. Numbers used in the alphanumeric database codes assigned to each level carry no significance other than identification.

Table 5

Level of Evidence Database Codes and Descriptions

Code	Description
LoE1	Large-scale meta-analysis or meta-synthesis
LoE2	A high-quality literature review that is replicable and comprehensive, and provides a synthesis and actionable recommendations predicated on the synthesis or systematic literature review
LoE3	Comparative, multi-course case study or large-sample study involving data collected from more than one site (e.g., course, program, and/or institution)
LoE4	Small-sample, single-site empirical study, which is theoretically grounded and completed by trained researchers
LoE5	Descriptive study that includes observations, advice, and/or recommendations for practitioners
LoE6	Opinion of respected authorities or expert communities without original supporting data.
1BC	One brief citation only. Studies that include only one brief citation of the Garrison et al. (2000) article in a literature review or background section.

The purpose of categorizing and coding artifacts using the level-of-evidence scale was to provide some initial order to a large data set and to add useful meta-data codes to records stored in the study database. The inclusion of the levels-of-evidence codes adds flexibility for future searches of the online database.

However, part way through the active research phase, it was realized that recording a level of evidence for studies that did not use the CoI framework at a methodological level would provide misleading or skewed information. For example, many artifacts cited the seminal article solely to aid in describing terminology, processes or components of online learning, but then incorporated a totally unrelated framework or model to conduct the actual research (Khoo, 2010; McCloskey, 2010; Osman, 2008). For this reason, level-of-evidence classification was recorded only for studies incorporating CoI seminal article processes at a methodological level.

Methodological quality assurance procedures were documented in a research journal; any anomalies, exceptions, or potentially controversial coding decisions were documented in research memos and discussed with a colleague or the research supervisor.

Step 5 Study characteristic appraisal.

As mentioned in Step 2 above, basic artifact bibliographic coding was applied concurrently to each document as it was retrieved and added to the Zotero database. Basic bibliographic codes included title, author(s), year of publication, type of item, name of publisher or publishing journal, place of publication, date of retrieval, and abstract.

To perform the study characteristic appraisal, the Zotero database was merged into a word processing program to produce individual, printed Proforma forms for each artifact. The printed Proforma forms were then used to guide systematic recording of study characteristics for each artifact, as well as to provide a written record of coding notes. The Proforma tool is an original design of the researcher, but is based on examples provided by the Campbell Collaboration (Hammerstrøm, Wade, & Jørgensen, 2010). The main purpose of the Proforma tool was to ensure consistency in document acquisition, identification, and categorization, and was calibrated and revised in a 50-artifact pilot study. (See Appendix C)

In Step 5, full-text artifacts were scrutinized twice following a year-by-year approach. The first examination was done to confirm citation of the seminal publication, artifact type, peer-review status, study type, and level of evidence. Zotero tags (codes) for each of these characteristics were applied to the artifact record in the database. Artifacts that were not empirical primary studies, published in English, or peer-reviewed

were tagged accordingly and copied to a folder designated for excluded artifacts. All occurrences of citations of the seminal Garrison et al. (2000) publication within each artifact were noted, and where allowed, were digitally highlighted and memoed. A small percentage of full-text files were "read-only" protected, so highlighting and comments could not be saved within the actual full-text file. This information was also recorded by hand on the Proforma for each artifact. If there was only one brief in-text citation of the seminal article found, this fact was noted on the Proforma, and the item was tagged as "1BC" (one brief citation), in Zotero and excluded from further examination.

If the artifact contained more than one brief citation of the seminal Garrison et al. (2000) publication, it was reviewed a second time to identify and record variable study characteristics such as type of study, research methodology, sample size, study population, educational modality, CoI component studied, and study purpose. Zotero tags for each characteristic were applied to the digital database record and recorded on the printed Proforma page for each artifact. These artifacts were then copied to the Zotero folder designated for included artifacts.

By the end of this stage in the study, publication information and study characteristics for all reviewed artifacts was recorded in the Zotero research collection database, and all artifacts had been systematically scrutinized for study inclusion criteria, level of evidence, and study characteristics. The database was checked once more for duplicates or incomplete records before proceeding to Stage 3, and was backed up to an online website and an external hard drive.

Stage 3 – Thematic Coding and Analysis

Step 6 Data export.

When the data collection and study characteristic coding were complete at the end of Stage 2, the chronological sub collections were amalgamated into a master dataset in Zotero. The finalized database thus consisted of 12 chronological subsets and one master collection and contained a total of 1,515 individual artifacts. The master collection was exported to a comma-separated values (CSV) file, then imported into a spreadsheet program for further analysis in Step 7.

Step 7 Artifact descriptive analysis.

Spreadsheet software features were used to sort, filter, query, analyze, and plot characteristics of the database using publication information and Zotero tags. See Chapter 4, Descriptive Findings, for the results of this descriptive analysis.

Up to this point in the study, all 1,515 records in the study database were included. Steps 8, 9 and 10 document the three thematic synthesis process steps and report how the artifacts included in the thematic synthesis analysis were identified and manipulated. It had been anticipated that approximately 240 studies would be included in the thematic analysis stage of this study; however a total of 329 artifacts were eventually included. The included artifacts were analyzed in sets by year of publication.

Step 8 Identification of basic themes.

Steps 8, 9, and 10 follow the protocol advocated by Thomas and Harden (2008) and were conducted accordingly. The terms “basic,” “organizational,” and “global” used here to identify the three levels of thematic analysis are adopted from Attride-Stirling (2001), and no connotation or alternate meanings for these words is implied.

The 329 artifacts identified for inclusion in the thematic synthesis were re-examined to determine how the Garrison et al. (2000) seminal article had been used within the artifact, and then relevant sections were subjected to sentence-by-sentence open-coding based on the research question, namely: What is the nature, focus, and context of empirical research that has been undertaken on the CoI framework since the publication of the Garrison et al. (2000) seminal paper?

Subsets of included artifacts were analyzed chronologically, as it was expected that new themes would emerge due to technological change and increased acceptance and adoption of online education. To start coding, each included artifact was read and re-read using a problematizing approach that "goes beyond the semantic content of the data, and starts to identify or examine the underlying ideas, assumptions, conceptualizations, and ideologies that are theorized as shaping or informing the semantic content of the data" (Braun & Clarke, 2006, p. 84). Attride-Sterling (2001) refers to this initial set of codes as basic themes or "lower-order premises evident in the text" (p. 388).

Initially it was anticipated that a qualitative research analysis program such as ATLAS-ti would be required to complete qualitative analysis at this stage, but during the active research phase, it was realized that the Zotero tagging system served this function well and improved study process and analysis efficiency. As each artifact was examined, notes were recorded either by hand on the printed Proforma document for that particular item or digitally in the research database through the Zotero memo feature. Basic themes were posited and recorded in a coding table in a separate document.

As a result of the sampling strategy for the study, all included artifacts in the database published between 1999 and 2010, and 40 artifacts from each year between

2011 and 2014, were subjected to the same coding process using a year-by-year batching process. Tentative basic themes were recorded as they arose and compared with basic themes posited from earlier subsets. Included artifacts from earlier subsets were re-examined as new or evolving themes were deliberated. Possible research sub-questions were contemplated after analysis of artifacts published between 1999 and 2004 using emerging basic themes as a guide.

This same protocol was applied to all included artifacts published from 2005 to 2014, and the posited research sub-questions revisited after each year was complete. As the emphasis of this study centred on uses of the Garrison et al. (2000) keystone article, the focus was on the purpose for citations of the seminal article within each artifact.

Step 9 Identification of organizing themes.

This step involved examining basic theme codes for similarities and differences in order to start identifying organizing theme clusters. Basic themes were analyzed from different perspectives in a cyclical process. Attride-Stirling (2001) states that organizing themes represent "clusters of signification that summarize the principal assumptions of a group of basic themes so they are more abstract, and more revealing of what is going on in the text" (p. 389).

Organizing themes may arise from application of the sub-questions which may, in turn, suggest answers to posited sub-questions or even suggest new sub-questions (Braun & Clark, 2006). Braun and Clark (2006) recommend that themes be clustered in order to answer questions such as the following:

What does this theme mean?

What are the assumptions underpinning it?

What are the implications of this theme?

What conditions are likely to have given rise to it?

What is the overall story the different themes reveal about the topic?" (p. 94).

Organizing themes were parsed and manipulated from different perspectives, including how they contributed toward answering the main research question and relevant sub-questions. Selected individual documents within organizing theme code families were re-read to ascertain theme fit and strength. Step 9 was deemed to be complete when no new organizing themes appeared. Step 9 was completed before Step 10, Identification of Global Themes, began.

Step 10 Identification of global themes.

Global or analytic themes are clusters of organizing themes, and may represent lines of argument or logic (Finfgeld, 2003). Thomas and Harden (2008) contend that "while the development of descriptive [their term for organizational] themes remains 'close' to the primary studies, analytical [their term for global] themes represent a stage of interpretation whereby the reviewers 'go beyond' the primary studies and generate new interpretive constructs, explanations or hypotheses" (p. 1).

Organizing themes identified in Step 9 were studied from varying perspectives representing different interest groups such as theorists, instructional designers, and practitioners. They were also grouped subjectively and chronologically in order to discover relationships in order to posit global themes. Studies that were representative of posited global themes were re-read to test the credibility of each global theme.

Once the global themes reached an acceptable level of stability, their properties and relationships were compared and contrasted. Global themes were mapped against

relevant distance education topics, such as generations of distance education pedagogy, significant technological innovations (e.g., mobile devices), and major philosophical and pedagogical shifts in online education (e.g., open education and massive open online courses (MOOCs)), in order to understand how the CoI framework had been applied. Although this study was not conducted to identify or verify theory, global themes emerging from the study may assist in the development of distance education learning theories.

Peer Debriefing

Coding procedures and preliminary findings were discussed with a doctoral colleague on a weekly basis throughout Stages 2 and 3 of the study.

Feasibility

Although the volume of studies was prodigious, incorporation of software tools such as those described in this chapter, rendered the study feasible. Tong et al. (2012), using similar search and acquisition procedures, reported that the time required to complete an initial assessment of each study artifact averaged between 15 and 20 minutes. A similar amount of time was required to retrieve and archive individual artifacts for this research.

The practical logistics of identifying and acquiring a large body of scholarly literature are significantly easier to address since the advent of the Internet, academic reference management software, and Google Scholar and digitalization of scholarly literature. According to Harzing (2013), Google Scholar has reached maturity and is a comprehensive, stable, reliable, un-biased source for citation information, particularly for recent social science publications. In addition, most academic journals now publish in

both digital and analog formats, and have digitized past volumes, facilitating identification and retrieval through online journals and academic publication databases. In a pilot study conducted in preparation for this study, full-text copies of 50 CoI studies were identified, accessed, downloaded, and catalogued with ease.

In-depth, full-text document review, interpretation, and coding of several hundred articles was time consuming, but as this study required no ethics review, participant solicitation, or primary data collection, and was not constrained by academic programming timetables, the time and resources planned for this study proved to be sufficient.

Ethical Considerations

As no human subjects were involved in this research, Research Ethics Board approval was not required. Documents retrieved for this study were stored only on a private, personal computer network, and backed up to an online, private, password-protected storage repository. Academic copyright regulations and permissions were respected in all instances. Full-text documents were used by the researcher only for research purposes in keeping with copyright stipulations of the Educational Rights, Canadian Copyright Act (Government of Canada, 2012-2016), which allows reasonable use for academic purposes.

Limitations and Delimitations

Limitations, or weaknesses of this study that could not be controlled, are identified in this section. First, it was assumed that authors of empirical studies based on the Garrison et al. (2000) paper had correctly and inclusively recorded the citation to the original document. Papers based on the seminal article but that did not include a proper

citation were not included in this synthesis as there was no practical way of identifying such studies. As the data for this study consisted entirely of secondary data and relied on authors having applied accurate academic citation patterns, this study does not claim to be all inclusive. Efforts were made to account for variations in attribution style and citation errors or omissions.

A further limitation that could not be allayed prior to actual research was the possibility that no global themes would emerge from the data. With such a large, diverse body of research, the study might not reach the global theme identification stage if the basic and organizational codes were too diverse. However, given the size of the CoI-based literature collection and an anticipated 240-item dataset, it was anticipated that some global themes would emerge.

This study was highly dependent on the interplay of both online and locally installed proprietary and open-source computer software programs. As such, the data identification, acquisition, and analysis processes described in this study may change as a result of website or software revisions. Due diligence was applied to software and online tool choices, considering stability, longevity, and usability, in order to minimize the risk that software modifications placed upon this study.

Delimitations, or specific parameters that limited the scope and defined the boundaries of this research study, were chiefly determined by the study data, the purpose of this research, and the primary research questions. As mentioned earlier, the data for this study were restricted to empirical research studies citing Garrison et al. (2000). The three authors of the original study, Garrison, Anderson, and Archer, as well as many other researchers including Akyol (2011), Annabi (2006), Arbaugh (2007), Cleveland-

Innes (2012), Heckman (2006), Ice (2012), Kanuka (2005), Richardson (2010), Rourke (2002), Vaughan (2010), and many others, have published significant and influential CoI-based studies; however, only studies directly citing the seminal Garrison et al. (2000) paper were included in this dissertation research.

Although the resulting thematic synthesis and associated database may provide the foundation for the eventual cataloguing of all research pertaining to the CoI model or framework, it was not intended to be a definitive analysis of all Community of Inquiry research for the years 1999 through 2014. Future research will likely expand the parameters for data inclusion in the online database and thematic synthesis. Although this particular study uses the Garrison et al. (2000) CoI-based corpus of research, the methodology could be applied to any heterogeneous body of research; as such, the methodological, and synthetic processes are clearly documented in the dissertation.

As the purpose of this study was to explore the nature, focus, and context of CoI-based empirical research, this study did not attempt to synthesize conclusions or findings of CoI empirical research.

Researcher Bias

Researcher bias can be a limiting factor unless conscious and consistent efforts to mitigate biases are undertaken. Although the majority of the analysis was conducted by the researcher, the dissertation supervisor and a doctoral colleague were consulted regularly. As the goal of this study was to gather and report factual knowledge, not to judge or critique other studies or interpret data, researcher honesty and meticulousness had more influence on the outcomes of this research than did potential biases. Further, the choice of thematic synthesis as a methodology lessens the influence of bias. Barnett-

Page and Thomas (2009) state that while thematic synthesis involves some interpretation of data, its synthetic product is more likely to be "reproducible, and correspond to a shared reality" (p. 6), than most other research synthesis methods.

Study Outcomes

The thematic synthesis comprises the primary product of this study. A secondary outcome of this study is the database, which has been made available to others online through a Zotero open group. Users of the open, online database may search and query the collection guided by their own needs. Full-text copies of the artifacts are excluded from the online database in keeping with Canadian Copyright laws, but each artifact record includes publication information and meta-data, and in many cases URLs, facilitating efficient artifact location for database users.

Conclusion

This chapter discussed the study framework, data identification and collection protocol, as well as the three-stage thematic synthesis methodology. The trustworthiness of this study depends on the perception by the readers that rigourous data identification and collection measures have been applied in order to assure credibility of the results (Lincoln & Guba, 1985). This chapter includes explanation of the thorough cross-tabulation processes conducted to ensure a truly representative set of artifacts upon which to base this study. Methods for assessing artifact quality and database integrity were discussed as were the reasons for including use of a paper-based Proforma to ensure consistency in identifying study characteristics. Sections delineating study feasibility, ethical considerations, limitations and delimitations, researcher bias, and study outcomes concluded the chapter. The findings of this study are reported in the next two chapters.

Chapter 4 reports descriptive findings from analysis of Stage 1, Literature Search and Acquisition, and Stage 2, Artifact Appraisal. Chapter 5 reports findings from Stage 3, Thematic Coding and Analysis.

CHAPTER 4 - DESCRIPTIVE FINDINGS

As stated in Chapter 1, this study consisted of a comprehensive, systematic, thematic examination of the corpus of literature founded upon the Community of Inquiry model and framework introduced by the Garrison et al. (2000) seminal publication. The study sought to understand the nature, focus, and context of the empirical research that has been undertaken on the CoI framework since the publication of the original study and consisted of three main research phases: Stage 1, Literature Search and Acquisition; Stage 2, Artifact Appraisal; and Stage 3, Thematic Coding and Analysis. The findings of this study are reported in two separate chapters. This chapter reports findings from the Stage 1 and Stage 2 digital data acquisition and quantitative review processes. Chapter 5 reports the Stage 3 thematic synthesis findings of this study.

Stage 1 Artifact Acquisition and Initial Review Findings

This section reports findings related to the data acquisition process as well as basic to complex artifact characteristics recorded during Stage 1, Literature Search and Acquisition, and Stage 2, Artifact Appraisal, of the study. This first chapter of findings includes descriptive and quantitative analysis of the research artifact collection in order to provide a sense of the magnitude of the corpus of CoI seminal article citations and to initiate the process of answering the primary research question.

Data acquisition overview and insights.

Data were gathered primarily over the eight-month period of January 2015 to August 2015 and aggregated into a database using the Zotero reference management software program. As Zotero was a third-party extension to the Internet web browser Firefox, and the data gathering period covered eight months, some minor technical

incompatibility issues arose due to unsynchronized software updates of these two main research data gathering tools. These, however, were resolved with help from the Zotero support community, which was extremely proactive and responsive to reported issues or conflicts.

At the conclusion of Stage 1 data acquisition, the main research artifact database contained 1,515 artifacts. As anticipated, the majority of artifacts were located and acquired through Google Scholar searches. Extensive cross-tabulation with other prominent research search tools and sites, including ProQuest, scholarly journals, ERIC, EdIT, Science Direct, Gage, and EBSOHOST, open online journals like IRRODL, MERLOT, and the official Athabasca CoI website revealed that Google Scholar provided accurate search results. A thorough triangulation of search results from Google Scholar, Proquest, and five separate education thesis and journal article databases was conducted using 10 different search strings incorporating various key words or phrases. The cross-tabulation demonstrated that the most productive search results were obtained by first searching for the title of the seminal article in each data source, and then applying a Boolean search string for using the phrase “empirical” OR “case study.” Many artifacts were listed in more than one database, but checks for duplicates were conducted twice before the study database collection was finalized and all duplicates were removed.

An interesting finding from this stage of the research was that the seminal article title “Critical inquiry in a text-based environment: Computer conferencing in higher education” had been incorrectly referenced as "Critical *thinking* in a text-based environment: Computer conferencing in higher education" in 115 instances, yet articles containing this incorrect title were included in the Google Scholar search results. Google

Scholar search results were found to be 97% accurate, as determined by manually checking for the citation and reference within each item. The study data population of empirical, peer-review artifacts was intended to be representative only, and should not be considered an all-inclusive compendium of all instances of Garrison et al. (2000), citations. At the time of writing, Google Scholar listed 2,530 instances of Garrison et al. (2000) citations for the years 1999 to 2014. This study identified and catalogued artifacts from a variety of sources and, at the conclusion of the data acquisition stage, consisted of a collection of 1,515 artifacts, representing 60% of total Google Scholar citation instances.

Table 6 summarizes the Stage 1 data acquisition findings.

Table 6

Stage 1 Data Acquisition Summary

Artifacts between 1999 – 2014 meeting Stage 1data acquisition criteria	Number	Percent
Artifacts obtained using Google Scholar	1,265	85%
Artifacts obtained through other databases	119	8%
Artifacts obtained through ProQuest	66	4%
Artifacts obtained through Science Direct	65	4%
Total	1,515	100%

An unexpected complication arose during the data acquisition stage due to website download quota restrictions. In order to restrict automated extraction of data from websites, Google Scholar, ProQuest, and similar databases were found to have security restrictions on the quantity and timing of downloads to an single computer IP address. As the researcher frequently exceeded these pre-set limits, the restrictions proved to be somewhat problematic due to the semi-automated data gathering processes

employed in this study. The problem was overcome by batching data search and acquisition tasks by calendar year as well as by spreading data acquisition tasks over a longer time period.

Description of main study collection structure.

The finalized database consisted of a main collection with 12 subsets consisting of one subset for the years 1999-2003 (due to the small number of artifacts identified for those years), then one subset for each of the subsequent years 2004 through 2014. Dates could not be verified for 15 artifacts; these were removed from the collection at a later step. Table 7 shows the number of artifacts identified and collected for each of the 12 subsets.

Table 7

Study Subsets Sizes

Subset	Time Period	Artifacts
1	1999-2003	47
2	2004	39
3	2005	47
4	2006	69
5	2007	106
6	2008	108
7	2009	122
8	2010	160
9	2011	156
10	2012	177
11	2013	204
12	2014	265
ND		15
	Total	1,515

Acquisition challenges and anomalies.

The decision to group artifact retrieval by year proved beneficial in all study steps. Despite batch processing artifact searches by year, Google Scholar and ProQuest download restrictions continued to be problematic and required periodic Captcha code verification. Captcha codes require a user to complete a manual task such as entering the correct answer to a simple arithmetic problem or identifying pictures in order to prove the search was initiated by a human, not another computer.

Figure 4 shows the number of artifacts obtained through Google Scholar, ProQuest, Science Direct, and other sources by year.

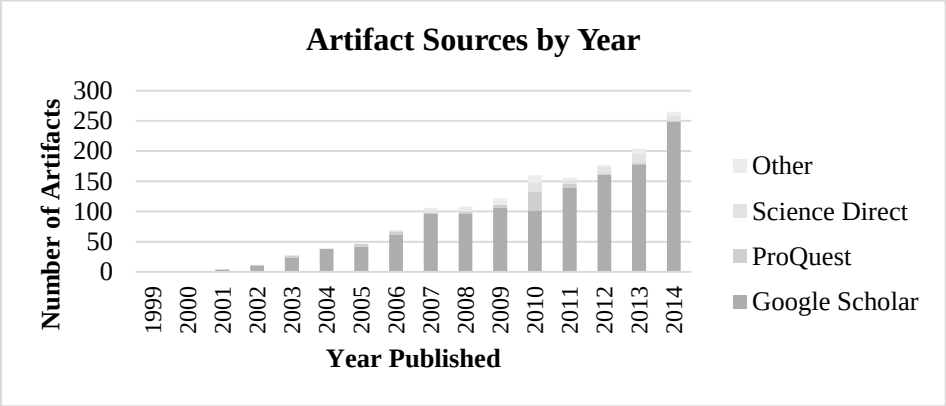

Figure 4. Artifact Sources by Year

Artifact anomalies.

As anticipated, basic artifact characterization information was recorded automatically by Zotero during Stage 1. Zotero performed as expected, with manual intervention and correction required in the following instances.

Artifact "item type" verification and correction. Zotero assigns an "item type" identifier to each item added to a database. There are 34 default item types, and a user

may create additional item type identifiers if required. For the purposes of this study, the following default item type identifiers were used:

- Book
- Book Section
- Conference Paper
- Document
- Journal article
- Manuscript
- Presentation
- Report
- Thesis

Zotero interpreted website and document meta-data in order to apply an "item type" code to each artifact as it was added to the database. During this study, it was found to be necessary to individually verify that the correct item type code had been applied during the download process. For example, a thesis was sometimes incorrectly coded as a book; book sections were sometimes incorrectly coded as journal articles; and unscholarly, non-peer-reviewed works such as departmental reports and scholastic resources were sometimes coded as journal articles. Correcting the item type was straight forward but time consuming.

HTML published works converted to PDF format. Some online, open journals publish solely in hypertext markup language (HTML) format. As this study required acquisition of full-text documents in digitized format, it was necessary to use a software program to convert HTML content to a downloadable portable document format (PDF). A Firefox Add-On called Print Page to Pdf was used to complete this process. Print Page to Pdf proved to be easy to use, efficient, and met the needs of this study.

Optical character recognition (OCR) to convert analog text to digital text. Some artifacts, although full-text, contained analog text that could not be searched using digital text search techniques. The OCR feature of Adobe Acrobat Pro XL was used to convert analog text to digital text. OCR analog to digital conversions were successful in every instance.

Artifacts published in closed journals. Full-text files for many artifacts were available only through password-protected websites and databases. This constraint was not problematic for this research as the researcher had access to all required sources through an academic affiliation but would present a barrier to researchers without such institutional support.

Artifact Type Characterization

The following section provides a summary of artifact types based on the main research database collection of 1,515 artifacts.

Artifact types summary.

Table 8 reports shows the number and percentage of each type of artifact archived in the database at the conclusion of Stage 1. Figure 5 is based on the same data but the data is charted by type and year.

Table 8

Stage 1 Artifact Item Types Summary

Artifacts between 1999-2014 meeting Stage 1 data acquisition criteria	Number	Percent
Journal Article	757	50%
Doctoral Dissertations	271	18%
Conference papers	256	17%
Book Sections	94	6%
Master's Thesis	48	3%
Books	33	2%
Other	56	4%
Total	1,515	100%

Figure 5 below shows the upward trend of each artifact type by calendar year using the artifact publication date. Academic journals accounted for half of the artifacts identified in the total collection, a trend that held true over the 15 years of data represented in this study.

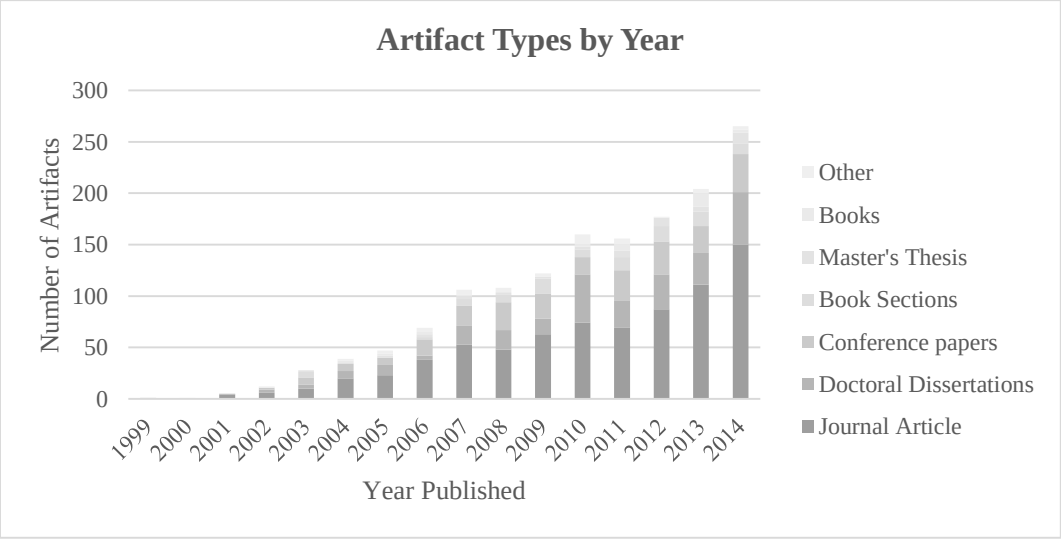

Figure 5. Artifact Types by Year

Journal artifacts. Scholarly or research journal articles was the largest item type group consisting of 757 or 50% of the total artifacts gathered. Further analysis of the

publication information for the journal articles revealed that 41% of the journal articles were published in 23 scholarly periodicals, as shown in descending order in Table 9 below. In total, 323 separate periodic journals were represented in the research database.

Table 9

Top 23 Journals Represented in Study

	Periodical Title	Artifacts Included in Study
1	Internet and Higher Education	46
2	Computers & Education	42
3	International Review of Research in Open and Distance Learning	31
4	Journal of Asynchronous Learning Networks	16
5	British Journal of Educational Technology	16
6	International Journal of E-Learning & Distance Education	15
7	E-Learning and Digital Media	15
8	American Journal of Distance Education	12
9	Journal of Interactive Online Learning	12
10	Educational Technology Research and Development	10
11	Journal of Computer Assisted Learning	10
12	Journal of Online Learning and Teaching	10
13	Distance Education	9
14	Interactive Learning Environments	9
15	Academy of Management Learning & Education	9
16	Computers in Human Behavior	9
17	Australasian Journal of Educational Technology	8
18	MERLOT Journal of Online Learning and Teaching	7
19	Quarterly Review of Distance Education	6
20	Canadian Journal of Learning and Technology	5
21	Innovations in Education and Teaching International	5
22	Journal of Educational Computing Research	5
23	Journal of Developmental Education	5

Thesis artifacts. Graduate-level dissertations and theses formed the second largest item type group of artifacts in the database with 319 individual artifacts or 21% of the total collection. Further analysis of this group of artifacts revealed that 85% were at the

doctoral level and 15% at the master's level. The year-by-year variation of theses and dissertations citing the seminal article is shown in Figure 6 below.

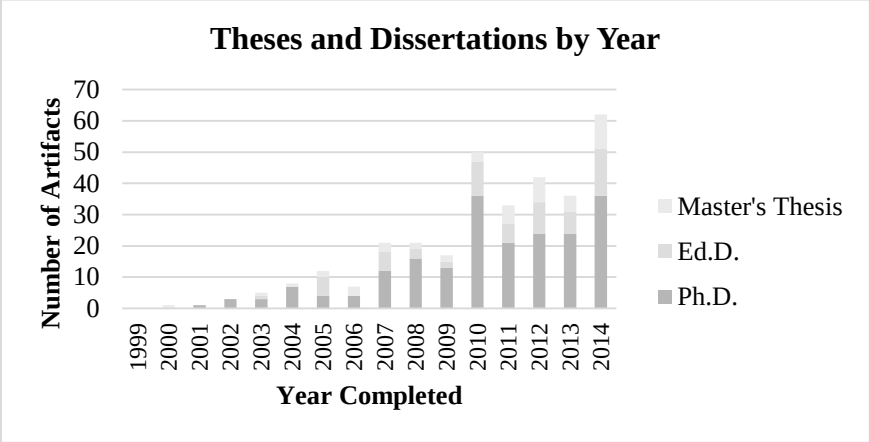

Figure 6. Graduate Dissertations and Theses Citing Garrison et al. (2000) 1999-2014

Conference papers. The third largest item type group consisted of conference papers. A total of 256 (17%) conference papers were added to the study database. It was noted during the check for duplicate studies that many studies published as conference papers had also been published as journal articles or a dissertation or thesis. In these cases the artifact that contained the most detail was retained in the study database**.**

Books, book sections and imprecise documents. Books and book sections (chapters) together totalled 127 representing 8% of the total Stage 1 collection. Artifacts that were clearly not journal articles, theses, conference papers, books or book sections were identified by Zotero item type codes as manuscripts, reports or documents. This mixed group consisted of 56 individual items comprising 4% of the total database. Ultimately all books, book sections (with one exception), and non-empirical manuscripts, reports or imprecise documents were excluded from the Stage 3 thematic synthesis portion of this study.

Stage 2 Artifact Appraisal

During stage 2, each artifact was examined using digital text search tools to determine, where and how the seminal Garrison, et al. (2000) study had been cited. A total of 910 artifacts were examined at this stage which included all artifacts in the collection published from years 1999 through 2010, and the top 40 artifacts, ranked by citation count, for each year between 2011 and 2014. The number of artifacts published from 2011 to 2014 was significantly higher than earlier years so Google Scholar rank was used to identify the top 40 artifacts from each of those years. No other alterations to processes were required and no complications arose. Digital text searches for key terms or phrases proved indispensable at this step as did the ability to mark and record comments within each document. The Zotero memoing function and the printed Proforma sheets were used to record anomalies, exceptions, or potentially controversial coding decisions.

Of the 910 artifacts examined, 581 (64%) did not meet criteria for inclusion in the thematic synthesis, and 329 (36%) met the criteria. As mentioned earlier, only peer-reviewed artifacts, representing primary empirical studies published in English and containing meaningful citations of the Garrison et al. (2000) study were included in the thematic synthesis.

Of particular note were the number of artifacts excluded due to the fact that they contained only one brief citation of the seminal publication. In these artifacts the Garrison et al. (2000) reference was included only once and in a nominal fashion. For an example, see Schultze (2010), page 13. It was deemed that these artifacts would be excluded from the thematic synthesis as they did not contribute in a meaningfully way to

the body of literature based on CoI concepts or processes. Accordingly these artifacts were coded "1BC" (one brief citation) when this condition was encountered so those particular artifacts could be filtered from further processing. A total of 258 (28%) artifacts of the 910 artifacts examined at this stage were found to contain only one brief citation.

With one exception, books and book sections were exempted from the thematic synthesis as most did not consist of a complete write-up of specific empirical studies and it was impractical to obtain full-text copies. However, the Starenko (2007) book section was included as it reported an important high-level CoI-based empirical study. Comprehensive literature reviews or syntheses of research were included only if they met the APA (2010) definition of being a "critical evaluation of material that has already been published" (p. 10).

Figure 7 below displays disposition of all artifacts through Stages 1 and 2.

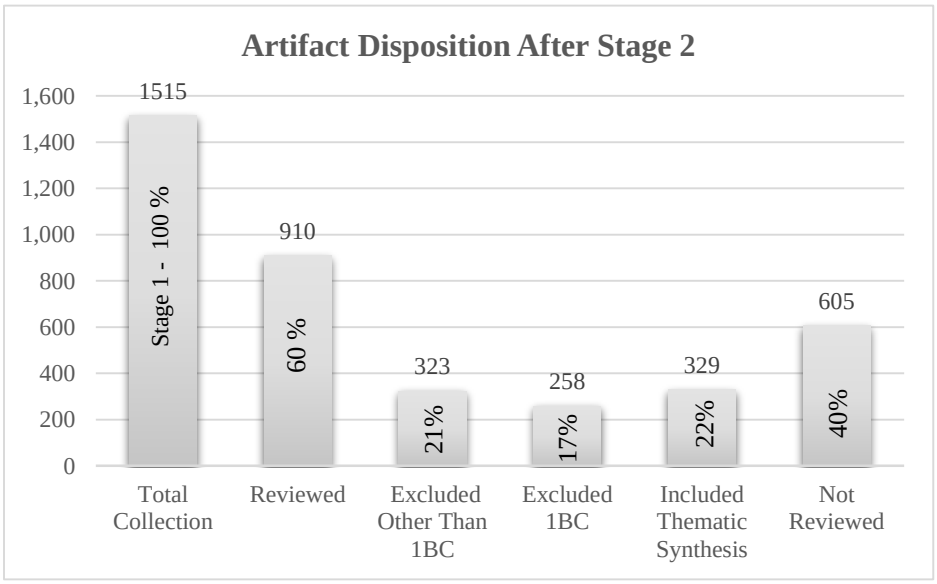

Figure 7 Disposition of Study Artifacts after Stage 2

Conclusion

The data gathering and cataloguing processes in this study were executed as expected, with a few anomalies as discussed above. The size of the study database was larger than anticipated and is believed to be a comprehensive exemplification of the larger corpus of CoI-based research. The findings reported in this and the next chapter demonstrate that the corpus continues to increase in popularity, size and diversity, and that academic journals are the most prolific contributor to research publication.

Outcomes from the digital literature search, acquisition and inspection processes show promise in enabling a user to acquire and organize larger volumes of digital artifacts than has previously been reported. Google Scholar proved to be an effective, fairly comprehensive research literature search tool particularly for English language academic publications in North America and Europe. In this particular study, Google Scholar reliably identified 85% of the study collection which demonstrates that use of Google Scholar might be reliable enough to reduce repetitive individual searches in multiple databases. Figure 4, Artifact sources by year, shows that Google Scholar search results increased in reliability over time for this particular type of research when compared with other sources of research literature.

The seminal publication that is the focus of this study is frequently extolled as a framework for assessing online learning that "has been widely cited in the literature" (Buraphadeja & Dawson, 2008, p. 141), a fact has been used to justify adoption of the CoI framework in subsequent papers, yet a substantial number of the studies citing this paper do not contribute to the corpus of CoI-based research in a meaningful way. Of the 910 artifacts reviewed, 258 (28%) contained only single, passing references to the

seminal article. This is likely true for citations in general, but the problem of locating key research based on a particular model or framework in an efficient manner is exacerbated by the fact that lists of search results will likely contain many unimportant, immaterial results. For this particular study, it appeared that including titles of influential relevant journals as parameters in Google Scholar searches for academic journal articles might yield more fruitful results. (See Table 9 for the list of journals most frequently publishing CoI studies.)

Findings reported in this chapter were based on analysis of the complete study database containing 1,515 artifacts at completion of Stages 1 and 2. Chapter 5 reports the findings from the thematic synthesis conducted on the 329 artifacts that met Stage 3 inclusion parameters.

CHAPTER 5 - THEMATIC SYNTHESIS FINDINGS

This chapter reports the thematic synthesis findings derived from the 329 artifacts meeting thematic synthesis inclusion parameters. It was originally anticipated that approximately 240 studies would be included in the thematic stage of this study, but in fact 329 artifacts met Stage 3 parameters and were included in the synthesis. A complete reference list for the 329 included artifacts is included in this dissertation as Appendix D. This chapter describes the findings from the three thematic synthesis process steps, firstly identifying basic themes, secondly organizing themes, and finally global themes. The three theme labels of "basic," "organizing," and "global," are adopted from Attride-Stirling (2001) and no other connotation for meanings for these words is implied.

Table 10 below shows the types of artifacts included in the thematic synthesis portion of this study:

Table 10

Item Types Included in Thematic Synthesis

Artifacts Between 1999-2014 Meeting Stage 3 Thematic Synthesis Inclusion Criteria	Number	Percent
Journal articles	194	50%
Theses and dissertations	85	31%
Conference papers	51	19%
Book Sections	1	0%
Total	329	100%

Stage 3 – Thematic Coding and Analysis

Basic theme identification.

The unit of analysis was a complete artifact. Each included artifact was searched for all occurrences of citations of the Garrison et al. (2000) seminal article, and, where allowed, the citation was digitally highlighted and annotated within the artifact digital file

itself. A very small percentage of the artifacts had read-only protection on the full-text file so that digital annotation was not possible. In these cases, hand-written notes were made on the printed Proforma sheets.

Diverse citation styles were taken into consideration. That is, the citation style used in each artifact was noted and searches for occurrences of seminal publication citations were conducted accordingly. By far the most frequently used citation style was American Psychological Association (APA), but Institute for Electrical and Electronics Engineers (IEEE), Modern Language Association (MLA), and Chicago styles were also encountered.

During this stage of the study, all artifacts meeting inclusion criteria for the thematic synthesis were re-examined with the intent of understanding the purpose of each seminal CoI citation within each study. Within each artifact, the location and purpose of each seminal article citation occurrence was noted. Where the citation(s) was located and how the Garrison et al. (2000) CoI framework had been incorporated in the artifact contributed significantly to the thematic synthesis.

If artifacts contained multiple references to the Garrison et al. (2000) seminal publication, all instances of citations were considered, but only the citation demonstrating the highest level of research usage was thematically coded. For example, if an artifact incorporated a Garrison et al. (2000) citation in order to explain how to conduct quantitative content analysis on discussion forum postings, and then also applied the Garrison et al. (2000) content analysis protocol in the methodology section, the artifact was coded with a research measurement methodology theme code, not a descriptive

theme code. Thus each artifact was coded with only one theme code representing the highest level of research usage.

Originally it had been expected that only artifacts representing studies that had incorporated the CoI framework as a research methodology would be included in the thematic synthesis. Accordingly, during examination of subsets 1 through 4 (1999-2005) in Stage 2, artifacts that contained Garrison et al. (2000) citations in literature or background sections only, and not in theoretical or methodological sections, were excluded from the thematic synthesis. However, the number of artifacts that had cited the seminal publication solely to introduce terminology, concepts, or analysis protocol was extensive. Upon reflection, it was realized this classification of artifacts formed an important sector of the corpus of CoI-based empirical studies. Consequently, study protocol was adjusted to include these artifacts in the thematic synthesis, and all previously excluded artifacts were re-assessed accordingly. As is explained in more detail later in this chapter, this decision led to the revelation of one of the important impacts the CoI model has had on distance, blended, and online education, namely that of introducing and defining concepts and related terminology for many-to-many technology-enabled education (Harasim, 2000).

Research adoption level was construed by noting the location of citation occurrences within the artifact and then by deducing the meaning of the related sections of text. For example, in Conole, Galley, and Culver (2010), the seminal article is referenced twice, both in the introduction section of the study write-up, firstly to indicate knowledge of the existence of the Community of Inquiry framework, and secondly to attribute the origin of the Garrison et al. (2000) description of communities of inquiry.

However, Conole, Galley, and Culver (2010) did not cite the Garrison et al. (2000) article in any other sections of their study; therefore, the Conole, Galley, and Culver (2010) artifact was thematically coded as a descriptive-type theme only.

On the other hand, Vaughan (2010) cited the seminal article seven times, with the highest level of citation of the seminal article framework at the research methodology level as evidenced in the following sentence located in the artifact abstract section and supported by several other citations in the inquiry methodology sections of the artifact:

> This Inquiry Through Blended Learning (ITBL) program adapted Garrison, Anderson, and Archer's (2000) Community of Inquiry framework in order to provide faculty participants with a guided inquiry process for discussing and reflecting on key redesign questions, exploring blended learning from a student perspective, integrating the new experiences and ideas, and then applying this knowledge through the implementation of a course redesigned for blended learning. (p. 60)

Vaughan (2010) explicitly stated in the methodology section of his study that he had adapted the seminal article framework as a research treatment in this study; as a result, the Vaughan (2010) artifact was thematically coded at the research treatment level.

Artifacts that were ambiguous and could not be definitively coded by the researcher were analyzed separately by another doctoral program colleague and then discussed in detail prior to deciding on a specific thematic code. Peer-debriefing (Lincoln & Guba, 1985) sessions were conducted on a regular weekly basis.

Basic themes were recorded in a spreadsheet that was reviewed after analysis of each subset was completed. A system of colour coding was used to identify themes as

they emerged. As additional basic themes coalesced, artifacts from earlier subsets were re-examined taking into consideration the emergent themes, and thematic coding was adjusted if appropriate. No new basic themes emerged after examination of subset 8 (2010), but due to the possibility that technological change or innovation might have affected how the seminal article was referenced in more recent years, 40 artifacts from each year from 2011 to 2014 were reviewed. Interestingly, no further themes emerged from artifacts published in recent years.

The finalized list of 24 basic themes is shown in the Table11 below. An exemplar artifact for each theme is included in the list as supplementary information.

Table 11

Basic Themes

Garrison et al. (2000) citation used to	Exemplar Artifact
Describe online learning environments and factors	Khoo, 2010
Describe online learning processes	McCloskey 2010
Define learning	Osman, 2008
Describe cognitive, teaching and/or social presences	Mykota & Duncan, 2007
Describe CMC text-based discussion forums	Chen et al., 2009
Describe online teaching.	Coll, Rochera, & de Gispert, 2014
Describe quantitative content analysis protocol and coding schemes	Moore-Cox, 2010
Explain collaborative constructivist learning to prospective teachers	De Freitas & Neumann, 2009
Assess effectiveness of non-CoI interventions in quasi-experimental research	Richardson, Ice, 2009
Adopt CoI content analysis protocol	Gorsky & Blau, 2009
Adopt CoI social presence analysis protocol	Nippard & Murphy, 2007
Adopt CoI protocol/concepts to assess discourse quality	LaMendola et al., 2009
Adopt CoI protocol/concepts to assess interaction	Kenny, 2014
Adopt CoI protocol/concepts to assess teaching presence	Hosler, 2009
Adopt CoI protocol/concepts to assess learning outcomes	Jahng et al., 2010
Adopt CoI protocol/concepts to assess evidence of cognition	Kennedy, 2010
Adopt CoI concepts as a treatment in quasi-experimental study to determine effect on retention	Lu, Hayes, & Yu, 2009
Adopt CoI concepts as a treatment in quasi-experimental study to determine effect on student learning	Zhan & de Montes, 2007
Adopt CoI concepts in course or program design or redesign	Vaughan, 2004
Adopt CoI framework as a treatment in quasi-experimental study to determine effect on interaction	Persico et al., 2010
Apply CoI framework to different contexts	McKerlich et al., 2011
Critique or use CoI framework as the basis for an extensive lit. review or meta-synthesis	Rourke & Kanuka, 2009
Compare CoI model against other learning theories/frameworks	Schire 2006
Validated or modify CoI model	Holder 2010

Organizing theme identification.

The next step in the thematic synthesis was to identify organizing themes. Organizing or analytical themes represent "clusters of signification that summarize the principal assumptions of a group of basic themes" Attride-Stirling (2001). In this study, organizing themes were derived through a speculative process. The chart of basic themes was frequently re-arranged to list basic themes with similar traits near to each other. This

process of refining and arranging basic themes lead to a conjecture that how the Garrison et al. (2000) seminal research had been applied within individual studies might be arranged in hierarchal levels or intensities similar to those found in learning taxonomies such as Bloom's taxonomy (1956) or the critical thinking content analysis rubric developed by Newman, Webb, and Cochrane (1995).

The depiction of basic themes was subsequently rearranged into groups according to how the CoI model (Garrison, et al., 2000) had been incorporated into the study reported in each artifact. Table 12 below displays the basic themes in a continuum of intensity beginning with themes that incorporated citations to attribute descriptions or definitions to the seminal authors, progressing to themes that attributed adoption of the Garrison et al. (2000) CoI framework to measure, apply, execute, influence, analyze, critique, differentiate and finally create. Eleven organizing themes were identified through this process.

Table 12

Organizing Themes

Organizing Theme Groups	Basic Themes
Describe	Describe online learning environments and factors
	Describe cognitive, teaching and social presences
	Describe quantitative content analysis protocol and coding schemes
	Describe CMC text-based asynchronous discussion forums
	Describe online teaching.
Define	Explain learning processes
	Describe/define online learning processes
Explain	Explain collaborative constructivist learning to prospective teachers
Measure	Assess effectiveness of non-CoI interventions in quasi-experimental research
Apply	Adopt CoI content analysis protocol
	Adopt CoI social presence analysis protocol
	Adopt CoI protocol/concepts to assess discourse quality
	Adopt CoI protocol/concepts to assess interaction
	Adopt CoI protocol/concepts to assess teaching presence
	Adopt CoI protocol/concepts to assess learning outcomes
Execute	Adopt CoI protocol/concepts to assess evidence of cognition
Influence	Adopt CoI framework as a treatment in quasi-experimental study to determine effect on retention
	Adopt CoI framework as a treatment in quasi-experimental study to determine effect on student learning
	Adopt CoI concepts in course or program design or redesign
	Adopt CoI framework as a treatment in quasi-experimental study to promote interaction
Analyze	Apply CoI framework to different contexts
Critique	Critique or use CoI framework as the basis for an extensive lit. review or meta-synthesis
Differentiate	Compare CoI model against other learning theories/frameworks
Create	Validated or modify CoI model

Global theme identification

It was noted that the organizing themes centred on four broad citation attribution use levels. The first level of seminal study citation was solely to attribute descriptions of concepts or processes such as a Community of Inquiry, presences, computer mediated communication, online learning, and constructivism, among others, to the seminal article authors, Garrison, Anderson and Archer. The second level of citation use was adoption, without change or query, of protocol or methods from the seminal research in order to

quantify results in primary studies using pre-experimental research designs such as one-shot, case-study, or one-group pretest-posttest designs (Neuman, 2007). The third level of use was adoption of the framework concepts, protocol, or methods from the seminal research as an actual treatment in quasi-experimental studies utilizing comparative, action research, or meta-cognitive strategies in order to determine the effect of CoI principles on a variety of factors including retention, learning, and interaction. The fourth and final level included deliberative studies where researchers sought to validate or extend the CoI framework proposed in the seminal research by testing it in different contexts, different populations, varying time durations, or by proposing additional presences. This level is different from the other three in that the focus of the research at this level was the CoI framework itself.

The four global themes are shown below in Table 13. These too are listed in a simple-to-complex order as determined by the level of use of the Garrison et al. (2000) seminal CoI framework within individual artifacts.

Table 13

Global Themes

Global Theme	Primary use
Describe	Cited in order to describe or define seminal publication concepts
Measure Variables	Cited to attribute seminal model concepts or processes adopted as tools to measure variables
Research Treatment	Cited to attribute seminal model concepts or processes adopted as a research treatment
Validate/Extend	Cited to validated or extended CoI framework itself or test it in different contexts

Thematic Synthesis Discussion

These four global themes are discussed in detail below following a simple to complex order beginning with the descriptive category, then the measurement category, the research treatment category, and finally the validate or extend category. Table 14 below provides a synopsis of the frequency of these four global themes within the thematic synthesis sample:

Table 14

Global Thematic Synthesis Synopsis

Global Theme Level	Artifacts	Percent of Thematic Synthesis Sample
1 - Describe	103	31%
2 - Measure Variables	126	39%*
3 - Research Treatment	30	9%
4 - Validate/Extend	70	21%
Total	329	100%
*.03% adjustment for rounding		

Global Theme Level 1: Seminal research cited in order to describe or define concepts.

Artifacts within this group cite the seminal research primarily to describe concepts, processes or terminology. This group of 103 artifacts comprised 31% of the 329 artifacts included in the thematic synthesis. Attribution to the seminal publication in this category were most often passive and in the form of direct quotes to aid in the explanation or discussion of terminology or concepts. These passive attribution citations were found most often in introduction, background or literature review sections of a publication.

Ultimately this global theme encompassed eight basic themes. Table 15 below identifies the eight basic themes that informed this global theme. Basic themes a. through d. emerged during examination of artifacts from 1999 to 2006; themes e. and f. emerged from artifacts published in 2007; themes g. and h. from those published in 2008 or 2009. As discussed earlier, no further themes emerged from examination of artifacts from 2010 through 2014.

Table 15

Components of Global Theme Level 1 - Describe or Define

	Global Theme Level 1 Components	Number of Artifacts	Exemplar Study
a.	Describe online learning environments and factors	39	Khoo, 2010
b.	Describe online learning processes	23	McCloskey 2010
c.	Define learning	12	Osman, 2008
d.	Describe cognitive, teaching and/or social presences	3	Mykota & Duncan, 2007
e.	Describe CMC text-based discussion forums	10	Chen et al., 2009
f.	Describe online teaching.	7	Coll, Rochera, & de Gispert, 2014
g.	Describe quantitative content analysis protocol and coding schemes	3	Moore-Cox, 2010
h.	Explain collaborative constructivist learning to prospective teachers	6	De Freitas & Neumann, 2009

Global Theme Level 2: Seminal research cited to attribute adoption of framework concepts or processes as tools to measure variables.

The primary use for seminal research attributions in global theme level 2 was to adopt methods or protocol in order to measure a variable such as social or cognitive presence. Citations at this level were found in the methodology sections of the artifact. These studies did not challenge or alter the seminal research methodology, but passively adopted it as a measurement device or protocol. An example of this is the adoption of the

Garrison et al. (2000) asynchronous text content analysis protocol (Heckman & Annabi, 2006; Leslie & Murphy, 2008)

This group was the largest of the four global categories consisting of 126 or 39% of the 329 artifacts included in the synthesis. This global theme level was also informed by eight of the basic themes as shown below in Table 16. Seven of these basic themes emerged during examination artifacts published between 1999 and 2007. One additional theme emerged during examination of artifacts published in 2008. As mentioned earlier no further basic themes emerged after this point in the study.

Table 16

Components of Global Theme Level 2 – Measure Variables

	Global Theme Level 2 Components	Number of Artifacts	Exemplar Study
a.	Assess effectiveness of non-CoI interventions in quasi-experimental research	38	Richardson, Ice, 2009
b.	Adopt CoI content analysis protocol	29	Gorsky & Blau, 2009
c.	Adopt CoI social presence analysis protocol	13	Nippard & Murphy, 2007
d.	Adopt CoI protocol/concepts to assess discourse quality	4	LaMendola et al., 2009
e.	Adopt CoI protocol/concepts to assess interaction	12	Kenny, 2014
f.	Adopt CoI protocol/concepts to assess teaching presence	8	Hosler, 2009
g.	Adopt CoI protocol/concepts to assess learning outcomes	5	Jahng et al., 2010
h.	Adopt CoI protocol/concepts to assess evidence of cognition	17	Kennedy, 2010

Global Theme Level 3: Seminal research cited to attribute framework concepts or processes adopted as a research treatment.

Global Theme Level 3 represents studies that purposefully applied Garrison et al. (2000) study concepts as treatments in quasi-experimental research situations. Similar to Global theme 2, citations in this group were also found in the methodology section of studies, but this group is different in that seminal article concepts or protocol had been used as treatments to test for causal relationships or factors. For example, studies in this

category often utilized two-group posttest or pre-treatment post-treatment data collection in order to determine if a CoI-based intervention had an effect (Lu, Hayes, & Yu, 2009; Mayne & Wu, 2011). This group also included meta-cognitive studies involving teacher training participants who learned CoI concepts in programs that had been modeled upon CoI principles (Paquette, 2009).

This was the smallest group of the four global themes consisting of 30 or 9% of the 329 artifacts. Four basic themes comprised this global category; themes a. and b. in Table 17 below emerged from artifacts published between 1999 and 2005, c. from artifacts published between 2006 and 2007, and d. from 2008 and 2009.

Table 17

Components of Global Theme Level 3 – Research Treatments

	Global Theme Level 3 Components	Number of Artifacts	Exemplar Study
a.	Adopt CoI concepts as a treatment in quasi-experimental study to determine effect on retention	1	Lu, Hayes, & Yu, 2009
b.	Adopt CoI concepts as a treatment in quasi-experimental study to determine effect on student learning	10	Zhan & de Montes, 2007
c.	Adopt CoI concepts in course or program design or redesign	13	Vaughan, 2004
d.	Adopt CoI framework as a treatment in quasi-experimental study to determine effect on interaction	6	Persico et al., 2010

Global Theme Level 4: CoI framework itself tested, validated or extended in different contexts.

Global theme level 4 was the most sophisticated level of seminal research adoption found amongst the artifacts included in this study and was comprised of 70 artifacts representing 21% of the thematic synthesis sample. At this level, artifacts describe research that was conducted to validate or refute the original seminal research or CoI framework through application in different contexts, timeframes, populations and

subject areas. Extensive reviews or synthesis works also appear in this global theme category but account for only one percent of the sample studied. Most of the studies in this category also used the CoI framework as a treatment, similar to global theme level 3, but with the intent of validating the CoI framework, not another factor such as retention. As a result, studies in this global category often suggested modifications or extensions to the original work, and in a few instances, developed significantly different new models based upon the seminal work.

Examples of artifacts that coded into this group were comparisons of the Garrison et al. (2000) model to other educational theories, models or frameworks such as the Bloom taxonomy (Bloom et al., 1956) or the SOLO taxonomy (Biggs & Collis, 1982). This group also included artifacts that either replicated the original research in larger or more diverse populations in order to confirm or refute certain claims stated by Garrison et al. (2000) (Arbaugh, Bangert, & Cleveland-Innes, 2010) or artifacts that used the seminal model as the basis for a new framework (Pozzi, Manca, Persico, & Sarti, 2007). As shown in Table 18 below, four basic themes informed this global level; two were identified during analysis of artifacts from 1999 through 2006, one from those published in 2007, and one from 2009.

Table 18

Components of Global Theme Level 4 – Test, Validate or Extend

	Global Theme Level 4 Components	Number of Artifacts	Exemplar Study
a.	Apply CoI framework to different contexts	26	McKerlich et al., 2011
b.	Critique or use CoI framework as the basis for an extensive lit. review or meta-synthesis	2	Rourke & Kanuka, 2009
c.	Compare CoI model against other learning theories/frameworks	4	Schire 2006
d.	Validated or modify CoI model	38	Holder 2010

Global theme trajectory.

Figure 8 below shows the trajectory of the four global theme categories from 1999 to 2010. Figure 8 excludes artifacts published in 2011 to 2014, as for those years only the 40 most highly cited artifacts were thematically synthesized. In those years the data would appear skewed due to the fact that a smaller proportion of artifacts was included in the thematic synthesis.

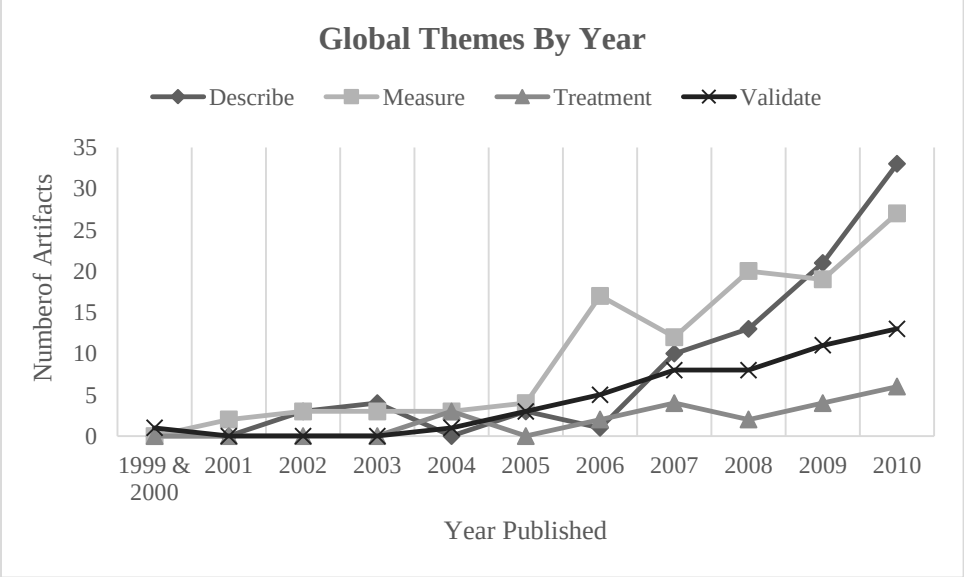

Figure 8. Global themes by Year 1999 to 2010

Sub-questions.

Artifacts coded to global theme levels 2, 3 and 4 where CoI concepts or processes had been adopted as a study methodology were analyzed further in order to show the permeation of the citation use of the seminal publication and to answer the sub-questions of this study. Artifacts coded to a descriptive theme were not included in this section due to the fact that information about populations or contexts from artifacts that had cited for descriptive purposes only was irrelevant to these questions.

What types of populations have been researched using the CoI framework?

Table 19 and Figure 9 below show that undergraduate and graduate student populations were the most commonly studied, and online educators the least. It should be noted that many artifacts included varied or combined populations such as pooled undergraduate and graduate participants, or did not clearly define the population studied. In the case of pooled populations, the artifact was counted in both categories.

Table 19

Analysis of Artifact Populations

Population Studied	Measure Level 2 Study*	Treatment Level 3 Study*	Validate or Extend Level 4 Study*
K-12 Students	5	2	4
Undergraduate students	30	9	17
Graduate students	27	8	31
Pre-service or practicing teachers	10	7	4
Online educators	2	0	1
Other (experts, literature)	3	3	1

* Studies including populations in more than one category were counted in each relevant category

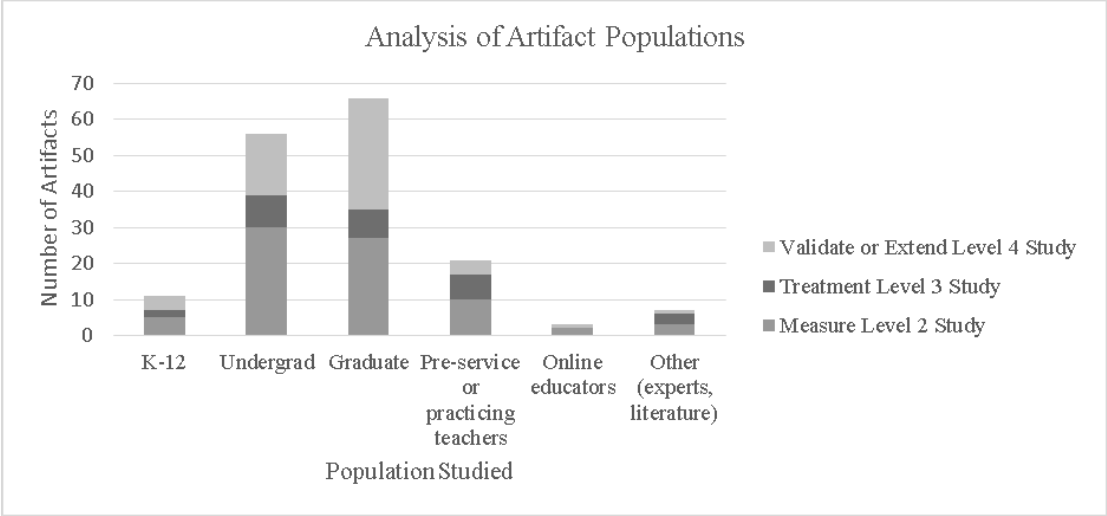

Figure 9. Analysis of Populations

Graduate populations from masters or doctoral programs were the most frequently studied groups, followed closely by undergraduate populations, most likely because many

educational researchers are higher education practitioners or students themselves, so logically use their own classes or colleagues as participants. Often studies reported pooling groups of undergraduate and graduate populations. Very few studies involved online educators; Lari (2008) used CoI-based content analysis to study the transition of classroom-based faculty to online teaching, and la Varre, Keane, and Irvin (2011) applied the CoI framework to a qualitative study examining on-site facilitator practices supporting rural high school students.

What components of the CoI framework have been studied? In some studies it was difficult to determine which component of the framework had been studied. Studies where this information was not present in the artifact write-up have been omitted from this analysis. As reported in Table 20 and Figure 10 below, the majority of artifacts utilized the entire CoI framework; fewer artifacts reported use of one of the three presences separately, but in similar frequencies. Interestingly, only two studies were identified as incorporating cognitive presence features as a treatment (Kanuka & Garrison, 2004; Prasad, 2009).

Table 20

Analysis of CoI Component Studied

CoI Component Studied	Measure Level 2 Study*	Treatment Level 3 Study*	Validate or Extend Level 4 Study*
Entire framework	49	19	56
Teaching Presence	16	7	21
Social Presence	23	6	17
Cognitive Presence	25	2	11

* Studies may be counted in more than one category

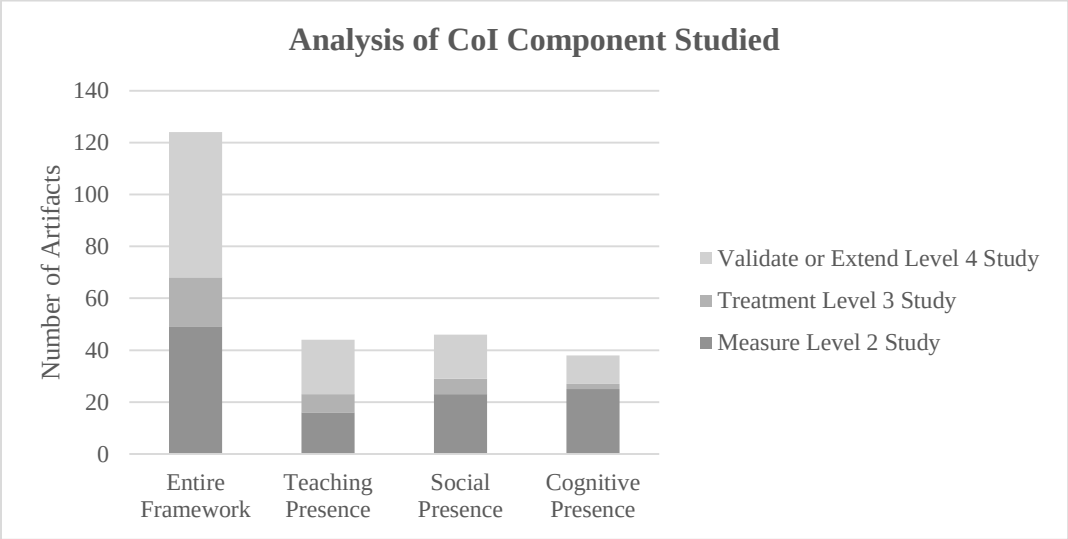

Figure 10. Analysis of CoI Component Studied

In what educational modalities has CoI research been conducted? Many studies collected data from more than one modality, for example both fully online and blended contexts, and therefore, are listed in two categories below. Table 21 and Figure 11 below report the number of artifacts in each of the four educational modalities found in the thematic synthesis collection. By far the most frequently researched modality was fully online, particularly when adopting CoI concepts for measuring variables. Blended learning was the next most common modality, predominantly incorporating CoI measurement protocols. Adoption of CoI concepts or elements as treatments in blended contexts had a higher frequency than in the other modalities. Very few studies conducted in face-to-face (onsite) contexts were identified, and those used CoI protocols to measure variables. No studies were found to have adopted CoI principles as practice to study the influence that adoption of these practices might have in face-to-face learning contexts.

Table 21

Analysis of Educational Modality Studied

Educational Modality Studied	Measure Level 2 Study	Treatment Level 3 Study	Validate or Extend Level 4 Study
Blended	21	11	10
Traditional Distance Education	6	0	2
Online	56	20	50
Classroom based (Face-to-face)	7	0	0

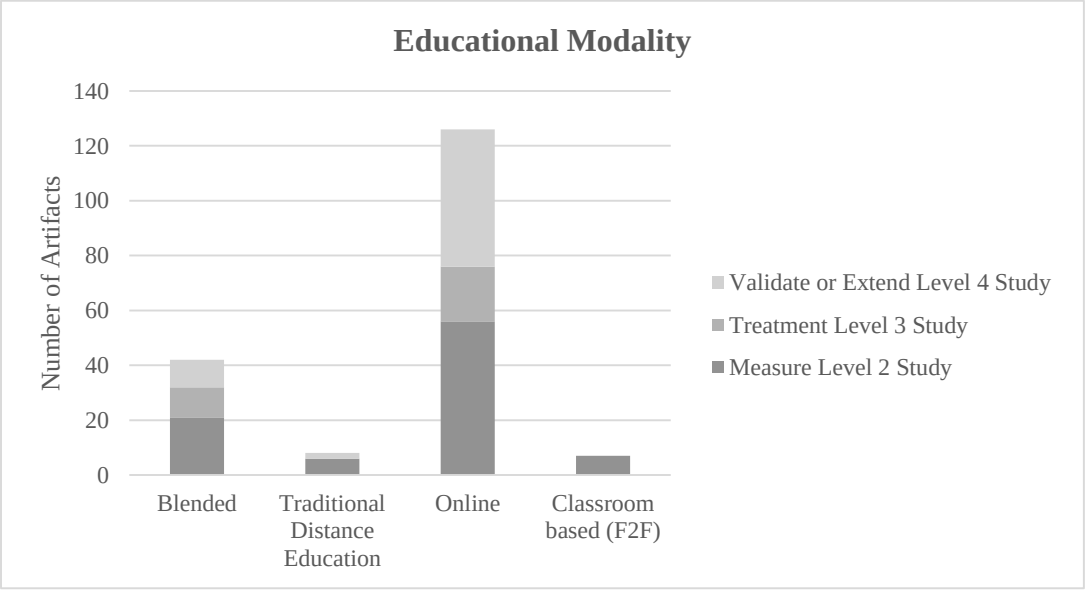

Figure 11. Analysis of Educational Modality Studied

What is the profile of the sizes of study populations? As described in Chapter 3, one of the variables recorded through adoption of a level-of-evidence (LoE) taxonomy was the sample population stated in each artifact. This aspect of each artifact was coded to one of six levels of evidence. These levels are more fully described in Chapter 3, so only a brief description of each level is included with the analysis below to provide a sense of size characteristics of sample populations. (See Table 22 below.) By far the most common size of the sample populations studied was small, single-site groups (64%). No level of evidence 6 artifacts were included in the thematic synthesis portion of this

study as this type of artifact is an opinion of respected authorities or expert communities without supporting original data. See Figure 12, Thematic Synthesis Level of Evidence below.

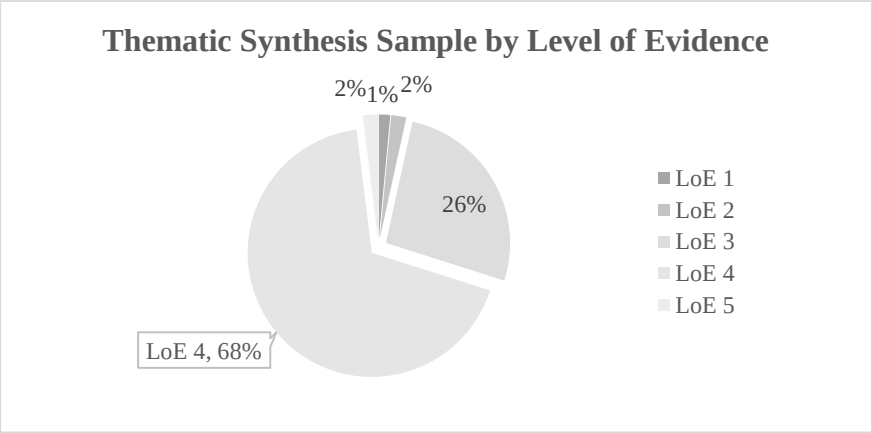

Figure 12. Thematic Synthesis Level of Evidence

Table 22

Brief Description of Levels of Evidence

Level of Evidence	Brief Description
1	Large-scale meta-analysis/meta-synthesis
2	High-quality literature review
3	Comparative, multi-course, or multi-site case or large-sample study
4	Small-sample, single-site study
5	Descriptive study that includes observations, advice, and/or recommendations
6	Opinion of respected authorities or expert communities without supporting original data.

CHAPTER 6 - CONCLUSIONS

This final chapter revisits the research problem and methodology, summarizes the important findings, and discusses their implications as well as opportunities for future research.

This study addressed the problem of making sense of a large corpus of research literature based upon the Garrison et al. (2000) Community of Inquiry seminal study. The study was structured using a thematic synthesis as it is considered an effective method for identifying, analysing, and reporting patterns or themes within a large, diverse body of literature. Perceptions that led to identification of the four global themes of this study may lead to development of a research implementation assessment scale lending credence to the claim that thematic synthesis can generate unanticipated insights (Attride-Stirling, 2001; Braun & Clarke, 2006; Dixon-Woods et al., 2006; Heyvaert, Maes, & Onghena, 2013; Ogawa & Malen,1991; Thomas & Harden, 2008).

The CoI Framework Continues to Resonate

This study confirms the fact that the CoI framework continues to be a crucial resource for distance, blended, and online researchers and practitioners. Every figure created during this study indicates a continuous upward trend, not only in citation counts, but in frequency of application of CoI-based concepts and protocols in a widening variety of contexts and populations. The fact that validation research of the CoI framework itself continues to increase is testament to the fact that the seminal framework continues to resonate with researchers and practitioners.

The CoI Framework is Technologically Neutral

The Garrison et al. (2000) study and publication was one of the first to describe factors and processes present in constructivist, collaborative, asynchronous, text-based, many-to-many online learning environments. The findings of this study strongly suggest that the terms, concepts, processes, and tools described in the seminal publication are still germane to distance, blended, and online researchers and educators. This is the case in spite of the fact that much of the technology and contexts used in distance, blended, and online education today did not exist when the Garrison et al. (2000) seminal work was published. Adoption of the CoI framework, terminology, and concepts continues to accelerate, a finding that confirms that the framework is technologically neutral. In fact, it may be that because most of the technological advances in distance, blended, and online learning are based wholly on many-to-many communication capabilities, that the CoI framework has flourished while others designed for a specific technology have not. For example, this thematic synthesis identified artifacts where CoI tools or methodology had been used to study factors such as learning, interactivity, student experiences, and satisfaction in blogs (Jimoyiannis & Angelaina, 2012), multi-player online video games (Voulgari, & Komis, 2010), virtual worlds (Burgess, Slate, Rojas-LeBouef, & LaPrairie, 2010), and Twitter (Lomicka & Lord, 2012) among others.

Figure 13 below plots noteworthy technology innovation milestones such as learning management systems, social media, synchronous and mobile interactions tools, on a timeline through the use of vertical rules. This figure shows that use of the framework to define terminology, investigate distance, blended, and online education experiences, measure factors, introduce CoI- based concepts to influence learning

conditions and experiences, and validate or extend the framework itself continues to increase steadily.

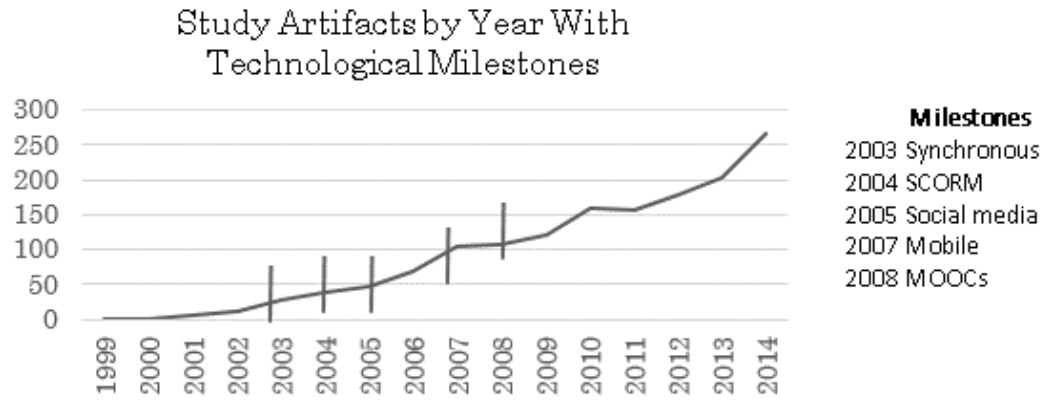

Figure 13. Study Artifacts by Year with Technological Milestones

A legend more clearly defining the milestones indicated by the rules in Figure 13 is included as Table 23 below.

Table 23

Noteworthy Educational Technology Milestones between 1999 and 2014

Legend	
1999-2002	Learning Management Systems - Blackboard (WebCT), Desire to Learn (D2L), Moodle, and Canvas, webblogs
2003	Improved Web Conferencing, synchronous LMS tools, Skype, Macromedia Breeze (now Adobe Connect)
2004	Intercompatibility between computer operating systems (SCORM)
2005	Connectivism, Facebook, Web 2.0, social networks
2007	Mobile learning, smartphones, tablets
2008	MOOCs (Siemens & Downes), Android OS

Citations for Descriptive Purposes Only Matter

An unexpected, but important, finding of this study was the recognition of the extent of citations used solely for attribution of descriptions. CoI-attributed description only citations formed 31% of the 329 artifacts in the synthesis, the second largest

thematic cluster of this study. This finding reveals that a sizeable proportion of overall citations of the seminal document represent authors who were incorporating CoI terminology and descriptions, not methodology, in empirical studies. This finding is important because it demonstrates the enduring nature of the concepts and terminology from the seminal publication, despite significant transformation in the technologies, intentions, and participants of distance, blended, and online education.

Implications of Global Themes Findings

Figure 14 below visually depicts the four global themes listed vertically in an inverted order progressing from simple to sophisticated research purposes, and with a left-to-right continuum of complexity. Font size for the global theme names and corresponding percentage values are size-representative in an effort to more clearly visualize these qualities of the CoI-based empirical research collection that formed the thematic synthesis sample for this study. Organizing theme descriptive words such as "describe," "exemplify," and "replicate" are included to help readers comprehend some of the ways researchers have used seminal article concepts.

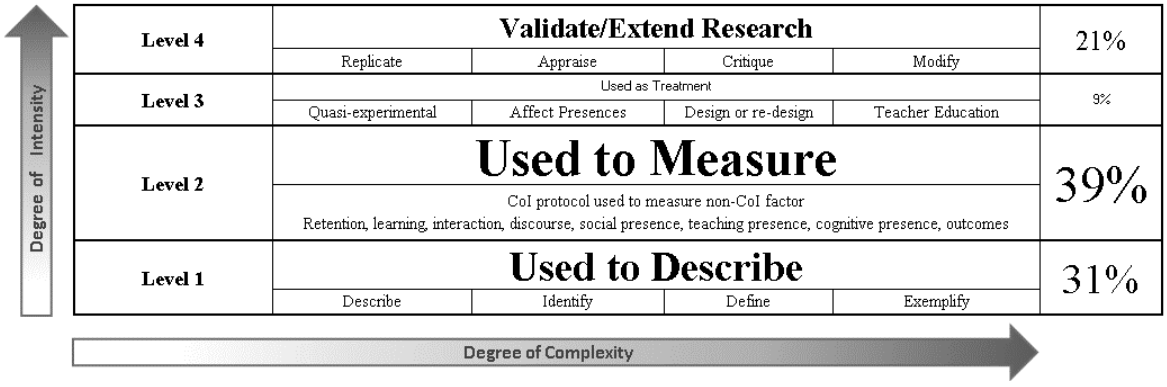

Figure 14. Visual Representation of Global Themes

As was illustrated by Figure 8 in Chapter 5, these four global themes themselves continue to proliferate. The following section presents the implications of the findings of the four global themes, discussed in a descending order from the most frequently used to the least frequently used.

Global Theme 2 – used to measure.

As stated by the seminal publication authors, the two primary purposes for introducing the Community of Inquiry were "to provide conceptual order and a tool for the use of computer-mediated communication (CMC) and computer conferencing" (Garrison et al., 2000, p. 87). The tool introduced in the seminal publication, and expanded upon in the three supporting papers (Anderson, Rourke, Garrison, & Archer, 2001; Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 1999) was "a reliable analysis tool" (Garrison et al., 2000, p. 102), consisting of a coding template, complete with social, cognitive, and teaching presence indicators.

As is demonstrated by the statistics displayed in Figure 14 above, that analysis tool has been widely applied. Global theme level 2, Used to Measure, representing 39% of the synthesis artifacts, shows that application of the analysis tool to measure a variety of factors and attributes was the leading reason for citing the seminal article. Within this category, 43% incorporated content analysis. Also within this category, the intact CoI framework was studied most often (40%), followed by cognitive presence (19%), then social presence (18%), and finally teaching presence (13%).

Global Theme 1 – used to describe.

As mentioned above, realizing the importance of citation for descriptive purposes only was an important but unexpected outcome of the synthesis. Usually a meta-

synthesis focuses on studies that have adopted similar frameworks as methodologies which means that artifacts representing studies that did not include the particular framework as a methodology would be excluded from further analysis. In the early stages of this study, artifacts in this category were excluded, despite the fact that many of the artifacts had numerous seminal article citations and many were themselves highly cited. However, the quantity of artifacts that were being excluded led the researcher to reconsider this excluded collection with the realization that for this particular study, this group added important information to the CoI synthesis. As a result, the synthesis parameters were altered to include artifacts that cited the seminal article solely for descriptive purposes.

Citations to the seminal document for descriptive purposes most often incorporated Garrison et al. (2000) descriptions or direct quotes of online communities (38%) and descriptions of online learning processes (22%). Garrison et al., descriptions of the three presences, online teaching, content analysis, and learning itself were adopted very frequently. It appears Garrison et al. (2000) has had a powerful influence in establishing the nomenclature for blended and online learning.

Global Theme 4 – validation or extension of the framework.

This global theme, similar to the others, has continued to trend steadily upwards. More than half of the studies (54%) represented in this group sought to validate the original framework. Use of Likert-type surveys, in particular the CoI Survey (Arbaugh et al., 2008) was found to be the most often used data collection method for testing the framework with 42% of the artifacts in this group adopting this method of gathering data. A smaller proportion of this group (35%) tested the framework by incorporating variables

such as different academic subject areas (Arbaugh, 2013), different contexts such as virtual worlds (McKerlich & Anderson, 2007), and varying course duration (Akyol, Vaughan, & Garrison, 2011). Less than one percent of the validation studies compared the CoI framework with other online or distance models. Only four such artifacts were identified, representing comparisons of the CoI framework with different models of cognitive thinking (Murphy, 2004), interaction pattern mapping (Schrire, 2006), and group social behaviour patterns (Scialdone, Howison, Crowston, & Heckman, 2008).

Global Theme 3 – used as a treatment.

This was the least often noted use of references to the seminal publication. Only 30 (9%) of the artifacts in the thematic synthesis had conducted quasi-experimental research using CoI concepts as a treatment. Within this smallest global theme level category, the most commonly tested factor was course design or redesign (Swan, Matthews, Bogle, Boles, & Day, 2012). Others sought to understand how changes in teaching presence or social presence might influence outcomes or retention (Borup, West, & Graham, 2012; Kupczynski, Davis, Ice, & Callejo, 2008). Similar to other theme groups, surveys represented the most common method of gathering data (60%), and quantitative analysis was used much more frequently than qualitative or mixed methods analysis.

Significance of the Research

Development of a technology augmented thematic synthesis methodology for this study amplifies the capabilities of meta-syntheses. Insights about citation use recognised during this study may lead to an analysis framework and adoption of research-use meta-tagging that might result in more efficient literature searches. Development and

publication of a prototype of an open access, online database of research artifacts provides a foundation for a more complete archive of CoI-based research as well as an example for others to adopt or advance in similar meta-synthesis projects.

This study has added new dimensions to the understanding of CoI-based research, revealing insights such as the influence the seminal publication has had on distance, online, and blended learning nomenclature not identified prior to this study.

During the course of this study, several unsolicited requests from research colleagues for sub-sets of CoI-based artifacts with specific characteristics were expedited through custom queries of the study database, confirming the conjecture that a meta-tagged collection of research articles would prove valuable to others. An example illustrating this was a request for artifacts representing studies that had suggested additional elements for the CoI framework. A reference list was very quickly generated from the study database using one of the theme codes developed for this research.

Gaps in the Research

This study reveals several striking gaps in CoI research. The first one is the scarcity of quasi-experimental studies where CoI concepts are implemented as experimental treatments, especially testing for causal effects on cognitive presence. Very few of the artifacts analyzed in this study tested for causal relationships, the vast majority opting instead for quantitative cross-sectional snapshots of a population.

More research studying the effect CoI-based practices has on variables such as interaction, learning, retention, and student satisfaction through adoption of CoI principles as research treatments will aid in evolving principles for shaping practice, particularly in K-12 online education and online facilitator training programs.

The second gap in CoI-based empirical research, which may be related to the shortage of quasi-experimental research, is that of qualitative studies focused on understanding the conditions that facilitate learning through communities of inquiry. Of the 225 artifacts that indicated use of a CoI element as a methodology, only 26% included use of qualitative analysis; 13% through purely qualitative means and 13% through mixed-methods study.

The third gap is research based on populations of children or adolescents. Blended and online learning opportunities for this demographic are increasing rapidly. Clark and Barbour (2015) claim that "the emergence of K-12 blended learning has brought online learning into the mainstream" (p. 5), and that "there is also a tremendous need for research in the emerging field of K-12 distance, online and blended learning" (p. 6). They estimate that in 2013, 76% of all schools in the United States were offering at least one online or blended course. In this present study only 11 artifacts studying K-12 populations were identified, with only two adopting CoI concepts on a research treatment level.

Future Research

As a result of this study, further research is planned in two areas. Firstly, the online database created in the present study will be subjected to further testing and updating. Future research in this area includes completing thematic synthesis on the unreviewed artifacts from this present study collection, as well as artifacts published after 2014. The results of these two additional syntheses will be added to the online database. In order for the online database to be beneficial for others, it needs to be more intensively reviewed, tested and critiqued. Members of the CoI online community and doctoral

colleagues will be invited to query the database and provide feedback to improve structure and coding.

The second area of future research will be focused on refining and testing a proposed framework for more quickly evaluating research adoption levels of use. The methods used and insights gained from this present study will be applied to a different corpus of influential distance or online education research such as the Framework for the Rational Analysis of Mobile Education (FRAME) Model (Koole & Ally, 2006) or Personal Learning Environments (PLE), social media, and self-regulated learning: A natural formula for connecting formal and informal learning (Dabbagh & Kitsantas, 2012) to see if the same levels of empirical study use and similar global themes emerge. This continues work on the methodology of technology-assisted thematic synthesis and providing more efficient ways for making sense of large bodies of knowledge.

Concluding Thoughts

This study demonstrates that the Community of Inquiry framework (Garrison et al., 2000) continues to be one of the most influential models for distance, blended, and online research and practice. Distance, blended, and online educational researchers, practitioners, and faculty have found the framework to be a valuable resource on many levels and in a variety of contexts.

Harasim (2000) identified only four truly fundamental communication technology inventions: writing, printing, telegraphy, and computer. Wide-spread adoption of computer communication technology in the 1990s permitted many-to-many (group) communication, time and place independence, text-based messaging and computer-mediated environments that had previously had been inconceivable (Harasim, 2000, p.

50). Garrison et al., fused deep understanding of learning and interaction with early, insightful, and comprehensive appreciation of the affordances provided by the relatively new (at the time) communication capabilities of the Internet into a framework that has become an indispensable constituent of distance, blended, and online learning research and practice.

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Zotero https://www.Zotero.org/

APPENDIX A

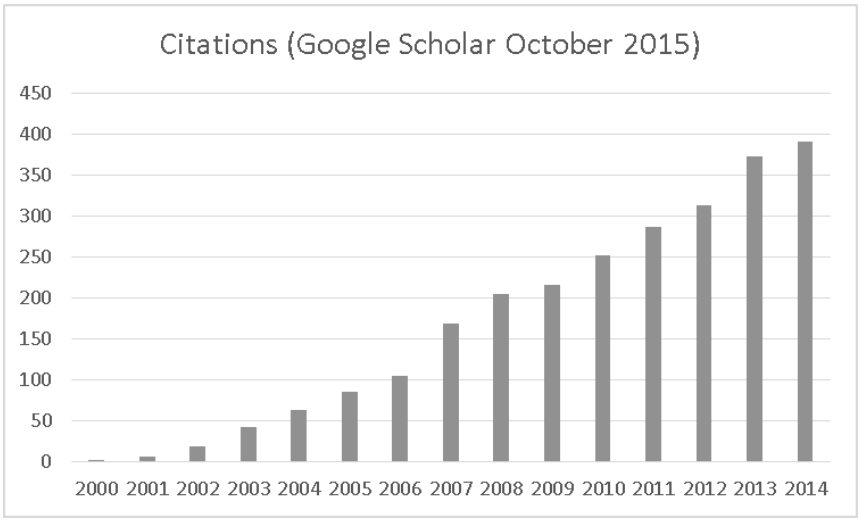
Seminal Publication Citations 2000 to 2014

Google Scholar citation count of Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education*, *2*(2–3), 87–105.

Table A1

Google Scholar Citations of Seminal Article

Year	Google Scholar Citations
2000	2
2001	6
2002	18
2003	42
2004	63
2005	85
2006	105
2007	169
2008	204
2009	215
2010	251
2011	286
2012	313
2013	373
2014	391



APPENDIX B

Artifact Record and Checklist by Process and Year

Step	Processes completed for each subset	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	Subset 6	Subset 7	Subset 8	Subset 9	Subset 10	Subset 11	Subset 12
		1999-2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	Google Scholar (GS) search of Garrison et al. (2000) citation lists by year	47	62	83	103	169	205	208	246	236	269	300	315
2	Search GS citation list for "empirical" OR "case study" count by year	30	35	44	63	100	114	118	132	145	174	211	222
3	Save Google Scholar results from Step 2 as a PDF May print or use digital format to use as a check-list doc.	√	√	√	√	√	√	√	√	√	√	√	√
4	GS results list from step 3 added to Zotero sub-collection. Basic artefact properties automatically recorded by Zotero	√	√	√	√	√	√	√	√	√	√	√	√
5	ProQuest Search for Garrison et al., "empirical" OR "case study" (2000) by year	9	2	7	6	8	34	33	47	56	73	65	74
6	Add items from ProQuest search to Zotero sub-collection for year (same folder as step 4)	√	√	√	√	√	√	√	√	√	√	√	√
7	Check incorrect cited items and add to subset master Zotero sub-collection folder	√	√	√	√	√	√	√	√	√	√	√	√
8	Verify basic study characteristics for all items in sub-collection folder are correctly recorded in Zotero	√	√	√	√	√	√	√	√	√	√	√	√
9	Check for and remove duplicates in Zotero	√	√	√	√	√	√	√	√	√	√	√	√
10	Total Subset Master Count from all sources, duplicates removed - list to merge with Proforma doc in Word	37	41	49	70	105	104	122	160	148	169	203	259
11	Print individual Proforma cover pages	√	√	√	√	√	√	√	√	√	√	*40 only*	*40 only*
12	Tag all items in combined sub-collection as "Proforma printed"	√	√	√	√	√	√	√	√	*40 only*	*40 only*	*40 only*	*40 only*

Step	Processes completed for each subset	Subset 1	Subset 2	Subset 3	Subset 4	Subset 5	Subset 6	Subset 7	Subset 8	Subset 9	Subset 10	Subset 11	Subset 12
		1999-2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
13	Check each item in sub-collection list for seminal article citation	√	√	√	√	√	√	√	√	√	√	√	√
14	Inspect and tag accordingly. Copy to "exclude" or "include" Zotero sub-collection folder (Proforma fields 1-2, 4-9)	√	√	√	√	√	√	√	√	*partial*	*partial*	*partial*	*partial*
15	Tag all excluded items "Ed.D. analysis excluded"	25	33	38	44	68	76	68	81	38	31	49	36
16	Tag all included items "Ed.D. analysis include"	12	7	10	24	35	45	54	79	22	9	11	20
17	Examine full-text of "included" artefacts and record on Proforma items 10-16	√	√	√	√	√	√	√	√	√	√	√	√
18	Export included studies to Excel - include quantitative fields for analysis	√	√	√	√	√	√	√	√	√	√	√	√
19	Analyze included study characteristics in Excel using quant. methods & charts	√	√	√	√	√	√	√	√	√	√	√	√

APPENDIX C

Study Document Characterization Proforma Version 3

(revised after pilot and subset 1)

Title:

Include or Exclude
Zotero Tags Recorded

1. Publication Type ☐ Journal article ☐ Book ☐ Book Section ☐ Thesis/Dissertation: Level _____ ☐ Conference Paper or Presentation	2. Level of Evidence ☐ LoE1 – large trial or meta-anal. ☐ LoE2 – Lit Rvw or Synthesis ☐ LoE3 – multi-site study ☐ LoE4 – single-site study ☐ LoE5 – descriptive ☐ LoE6 – opinion ☐ 1BC – brief citation only	3. Focus of Study _____ _____ _____ _____ _____ _____ _____
4. Publication Information ☐ Published ☐ In press ☐ Unpublished	5. Publication Location ☐ Journal ☐ Online database ☐ University Archive	
6. Garrison et al. (2000) reference verified Yes Not found	7. Original empirical research study based wholly or substantially on CoI theory Yes No	8. Include in dissertation research analysis Yes No 9. Include in CoI database: Yes No

10. Type of study ☐ Quantitative ☐ Qualitative ☐ Mixed-method ☐ Meta-analysis or synthesis	11. CoI Descriptors ☐ Entire framework used as basis for study ☐ CoI used as a partial but important component of study ☐ Study focuses on one presence only TP SP CP ☐ Study focuses on two presences _____ and _____ ☐ CoI used to measure change or compare two contexts ☐ CoI used to design or revise course ☐ CoI used as an influence in design of new framework ☐ Other _____ _____
12. Method ☐ Case study ☐ CoI survey tool used for data collection (Arbaugh et al., 2009) ☐ Other survey tool used ☐ Content or discourse analysis _____ ☐ Interview_____ ☐ Focus group(s) _____	
13. Educational setting (choose all that apply) ☐ Distance education (no online component) ☐ Blended (F2F, online or mobile components) ☐ Fully online (includes mobile) ☐ Face-to-face ☐ Private School ☐ Public School ☐ Other _____ _____	14. Study population ☐ K-12 students ☐ Undergraduate students ☐ Graduate students ☐ Pre-service teachers ☐ Practicing teachers ☐ Professional development participants 15. Context (discipline or content type) _____ _____
16. Location of study Country _____ Other geographic descriptor _____ Institution(s)/Agency(ies) _____	17. Sample: n = _____ ☐ Participants _____ ☐ Course(s) _____ ☐ Cohorts _____

18.	_____ _____

APPENDIX D

Thematic Synthesis Reference List

This list contains references for the 329 artifacts included in the thematic synthesis portion of this study.

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