

## **Conducting a Multivocal Thematic Synthesis on an Extensive Body of Literature**

## **Réaliser une synthèse thématique multivocale d'un vaste ensemble de documentation**

*Madelaine Befus, Athabasca University*

### **Abstract**

This paper will provide a methodology and progress report from a multivocal thematic synthesis being conducted on an extensive, diverse body of empirical studies. The study data includes a corpus of peer-reviewed empirical literature sharing a common reference published in English between 2000 and 2014.

In this study, data to be synthesized share a common reference to the Garrison, Anderson, and Archer (2000) seminal paper introducing the Community of Inquiry framework, one of the most influential distance and blended learning theories published (Halverson, Graham, Spring, Drysdale, & Henrie, 2013). The study has two deliverables: 1) a multivocal thematic synthesis analysing contexts, populations, learning and teaching environments, and aspects of learning being studying through the lens of the CoI framework; and 2) an online, open, dynamic compendium of all CoI empirical research citing the Garrison et al., 2000, seminal paper. The purpose of the study is two-fold: to bring systematization and organization to a large body of research to support the work of other researchers, practitioners, and policy makers; and to provide an up-to-date methodology framework for creating an online database from large bodies of literature with a common reference.

The data used in the thematic synthesis study consisted of full-text copies of peer-reviewed research articles. The data was analysed using an open, constant-comparative, three-stage thematic synthesis methodology. As the procedures used to gather, organize, and archive the data in this study could be applied to any multivocal body of research, the methodological processes was documented in detail to provide a framework for future research and may serve as an exemplar for sharing research data as an open-access resource.

## Resume

Cet article offrira une méthodologie et un rapport sur la progression d'une synthèse thématique multivocale en cours de réalisation sur un vaste ensemble d'études empiriques variées. Les données d'étude comprennent un corpus de documents empiriques évalués par les pairs ayant une référence commune et publiés en anglais de 2000 à 2014.

Dans cette étude, les données à être synthétisées ont en commun une référence à l'article phare de Garrison, Anderson et Archer (2000) ayant introduit le cadre de la communauté d'apprentissage, l'une des théories les plus influentes publiées sur l'apprentissage à distance et l'apprentissage mixte (Halverson, Graham, Spring, Drysdale et Henrie, 2013). L'étude vise deux réalisations : 1) une synthèse thématique multivocale analysant les contextes, les populations, les environnements d'apprentissage et d'enseignement, ainsi que les aspects de l'apprentissage étudiés dans l'optique du cadre de la communauté d'apprentissage; et (2) une collection en ligne, ouverte et dynamique, de toutes les études empiriques sur la communauté d'apprentissage citant l'article fondamental de Garrison et collègues (2000). L'étude a deux raisons d'être : systématiser et organiser un vaste ensemble de documents de recherche pour appuyer le travail d'autres chercheurs, praticiens et décideurs, et fournir un cadre méthodologique mis à jour pour la création d'une base de données en ligne à partir de vastes ensembles de documents ayant une référence commune.

Les données utilisées dans la synthèse thématique sont formées des textes intégraux des articles de recherche évalués par les pairs. Les données ont été analysées à l'aide d'une méthode comparative constante et ouverte de synthèse thématique en trois phases. Comme les procédures utilisées pour recueillir, organiser et archiver les données dans cette étude pourraient être appliquées à tout ensemble de documentation multivocale, les processus méthodologiques ont été documentés en détail afin de fournir un cadre pour des recherches futures et peuvent servir d'exemple pour le partage de données de recherche comme ressource ouverte.

## Introduction

The project described in this paper arises from a doctoral dissertation researching the influence of the Community of Inquiry (CoI) framework (Garrison, Anderson, & Archer, 2000) in distance and online education. Common to many academic dissertation undertakings, the purpose of the current project is to bring organization to, and to make sense of previous studies and publications in a specific topic or field; to delineate what is known or not known about the topic; and to identify a specific area of research within the topic that both interests the researcher and fulfills the expectation that the research will add important information to the body of knowledge on the topic.

For many research projects, the preceding steps of reviewing existing knowledge and identifying areas that make a case for further research are followed by steps that involve design and implementation of an appropriate research strategy to gather data, analyze data, describe findings, and then write up of the conclusions. However, the research project described in this paper diverges somewhat from the traditional research project pattern described above as the data being gathered and analyzed consists of empirical studies conducted by others. The use of

previously published research materials as data places this project in the “literature review” article category of the American Psychological Association (APA) and fits within the description of articles “including research synthesis and meta-analyses, [which] are critical evaluations of material that has already been published” (American Psychological Association [APA], 2010, p. 10).

The body of literature chosen for this project shares a common reference to a seminal paper published by Garrison, Anderson, and Archer (2000). Since the Community of Inquiry framework was posited by Garrison et al. in 2000, hundreds of researchers (Garrison, Anderson, & Archer, 2010; Garrison & Arbaugh, 2007; Halverson, Graham, Spring, & Drysdale, 2012; Rourke & Kanuka, 2009) have referenced the 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, student success and retention, as well as course and program design. Few education-focused academic publications have generated this amount of interest or empirical action (Halverson, Graham, Spring, Drysdale, & Henrie, 2013). Chronological categorization of Google Scholar© citations of the seminal CoI article provides evidence that the model continues to resonate within the education community despite extraordinary distance education and technological innovation, and copious distance education research in the intervening 14 years (See Appendix A).

The corpus of empirical research on the CoI model is substantial. Despite the extent of empirical CoI research, an up-to-date thematic research synthesis of the CoI model or an easily accessible database of this body of research literature does not exist. The proliferation of journals, online databases and archives and search engines such as Google Scholar© do facilitate literature searches (Fink, 2013) but there exists no easy way to organize and assimilate hundreds or thousands of articles on a particular topic. The absence of a CoI research synthesis or compendium means that researchers interested in the CoI model must seek and construct this literary resource individually and probably repetitively - a daunting and time-consuming task considering the quantity and diversity of CoI empirical research. As the body of CoI research continues to grow by several hundred articles each year, collecting and making sense of the accumulated knowledge becomes an even more formidable task, particularly for novice researchers.

In 1976, in his book introducing meta-analysis, Glass observed “Our problem is to find the knowledge in the information. We need methods for the orderly summarization of studies so that knowledge can be extracted from the myriad individual researches” (p. 4). The preceding statement aligns closely with the problem that this study is based upon, namely how to make sense of a diverse body of research reflecting different purposes, perspectives and contents but sharing a common foundation of the Community of Inquiry framework. Ogawa and Malen (1991) confronted this problem by devising a pragmatic research method they termed an exploratory case study method for multivocal literatures. They define *multivocal* literature as being comprised of all accessible writings on a common topic embodying diverse views or voices, appearing in a variety of forms and reflecting different purposes, perspectives and informational basis, addressing different aspects of the topic and incorporating different research or non-research logics.

Ogawa and Malen describe exploratory case study as “well-suited to the examination of complex contemporary phenomena...because the distinctive features of the exploratory case study parallel the major characteristics of multivocal literatures” (p. 274). This present study integrates multivocal exploratory concepts that include rigorous examination and recording of document characteristics; organizing, categorizing and open coding in order to elicit themes and patterns; and creation of a “formal, retrievable data base” (p. 280).

### **Deliverables**

The study will produce two deliverables: (a) a multivocal thematic synthesis analysing contexts, populations, learning and teaching environments, and aspects of learning being studying through the lens of the CoI framework, and (b) an online, open, dynamic compendium of all CoI empirical research citing the Garrison et al. (2000) seminal paper. The purpose of the study is two-fold: to bring systematization and organization to a large body of research to support the work of other researchers, practitioners, and policy makers; and to provide an up-to-date methodology framework for creating an online, digital database from large bodies of literature with a common reference.

A thematic synthesis of empirical CoI research for the wider community of distance education researchers, practitioners, administrators, and instructional designers may facilitate transference of empirical research to applied practice. Of the 12 synthesis methods discussed by Barnett-Page and Thomas (2009), thematic synthesis is identified as one of the methods most likely to “directly inform policy and practice” (p. 6). For the distance education research community, the synthesis may also identify areas of abundant or sparse research, dissention or agreement on aspects of the model, as well as innovative and pragmatic applications.

Upon completion of the project, the online archive will contain abstracts and publication information for all CoI empirical research articles that cite the Garrison et al. (2000) seminal paper. The archive will be structured such that users will be able to sort, search, and query the collection for their own research or synthesis purposes. In keeping with copyright stipulations for fair dealing for academic purposes, Canadian *Copyright Act* (*Copyright Act*, 2001) full-text documents will be used by the researcher for research purposes only and not added to the online archive unless allowed by copyright.

### **Method**

For the pilot study, Google Scholar© was used to identify all documents citing Garrison, Anderson and Archer (2000); Zotero™ research management software was then used to facilitate downloading, saving, and tagging the first 50 documents from this citation list as a calibration and methodological refinement exercise. Zotero™ automatically creates academic citations, downloads, and attaches full-text files (where accessible), saving substantial amounts of time both in acquiring and cataloguing documents particularly when studies are published in open journals. Full-text copies of all 50 documents were obtained through online digital databases or institutional libraries. As all study dates were 2000 or later, 49 (98%) of the first 50 full-text versions were readily available in digital format with meta-data which also facilitated document examination for key study parameters making it possible to retrieve and code documents rapidly.

The abstract, body, and reference sections of each document were examined to determine whether the paper contained a valid citation of the Garrison et al., (2000) seminal paper. A pro-forma tool, developed specifically for this project to record key document categorization information, was created for each study artefact (See Appendix B). The pro-forma tool is an original design, but is loosely based on examples provided by the Campbell Collaboration (Hammerstrøm, Wade, & Jørgensen, 2010). While the pro-forma tool was invaluable in ensuring consistency in document acquisition, identification, and categorization to safeguard data collection integrity and facilitate coding, it is not to be considered an *a priori* code table. The pro-forma tool has been piloted, and reviewed by colleagues and has proven to be an essential part of the data collection, coding, and database methodology used in this project.

As of March 19, 2014, Google Scholar© listed 1,902 citations of the Garrison et al., (2000) paper. The completed study will eventually include all documents citing the seminal paper, but this present pilot phase of the project was limited to the first 50 most relevant documents as identified by Google Scholar©. Identical document citation search parameters were applied using Harzing's (2014) open-source citation analysis tool, Publish or Perish© version 4.6.3, and returned the same citation count. Approximately 50 percent of the papers examined so far contained only one very brief reference to Garrison et al., (2000). Studies containing a sole citation of the seminal paper will not be included in the project analysis phase, but they will, however, be tagged accordingly and listed in the final project database to inform other researchers.

The populated and tagged Zotero™ database was then exported to a spreadsheet program which was used to analyze document characteristics and timelines. Subsequent phases of this project will involve exporting representational full-text research articles from the Zotero™ database into ATLAS-ti™ for thematic coding and content analysis. A three-stage free coding protocol for thematic synthesis developed by Thomas and Harden (2008) will frame the content analysis work.

## Analysis

Analysis in the full study will take place in two distinct analysis phases as described below; however, for this pilot, only phase 1 was completed.

**Analysis Phase 1.** Research study characteristics were analyzed quantitatively using data recorded on the year of artefact publication, level of evidence, study sample size, geographic location, research type, data collection method, data analysis method, education environment (online, etc.), educational context of study (grad, undergrad, etc.) participants, study discipline, and component of CoI component being researched. This analysis was conducted using a spreadsheet program.

**Analysis Phase 2.** Qualitative thematic content analysis coding will be conducted on at least 20 studies from each chronological subsample group. Studies to be included in the thematic synthesis will be identified during analysis phase 1 and will include studies that are based primarily on the CoI framework or components thereof. With each data subset sorted and

grouped chronologically by year, 20 full-text articles will be chosen based on the Google Scholar ranked relevance from each chronological group. These 20 artefacts will be subjected to paragraph-by-paragraph open-coding based on the research questions, 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?; and What factors have contributed to the continuing popularity of the CoI framework?

The coding protocol proposed for this dissertation research is similar to the thematic synthesis process followed by Thomas and Harden (2008). Each included study will be 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).

When all subsample groups have been coded, qualitative data analysis software will be used to analyze lower-order codes to discover analytical themes. Finally, analytical themes will be analyzed and mapped chronologically, subjectively, and technologically against the CoI framework itself as well as against developments in distance education pedagogy and technology, and major events in the life of the CoI model such as book publications, CoI measurement tool development, and special issues of journals. Analysis by year may reflect use of the CoI with technology such as chat, audio-, or video-conferencing that didn’t exist when the original paper was published, augmentation of asynchronous discussion forums with increased visual elements such as still pictures and use of wikis, blogs, and social media.

As the goal of this study is to gather and report factual knowledge, not to judge or critique other studies or interpret data, researcher honesty and meticulousness have more influence on the outcomes of the research than 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.

## **Results**

Preliminary analysis of the pilot sample of 50 peer-reviewed CoI research studies for the period 2000 through to 2013 that referenced the seminal Garrison et al. (2000) paper revealed a wide range of study types, some based on the entire Community of Inquiry (CoI) framework, others on individual or combinations of social, teaching, and cognitive presences. The pilot dataset included 41 journal articles, 4 conference papers, 3 book sections, 1 book, and 1 thesis. The earliest item was published in 1999, the most recent in 2014. If there was only one brief in-text citation of the seminal article included as background in the literature review section, the item was categorized as “1BC – one brief citation,” tagged and excluded from further examination. As a result of this initial document examination, 24 articles were excluded from further examination.

Three main categories of study foci appear to be: (a) validation of the CoI model itself and of CoI measurement instruments (Arbaugh et al, 2008), (b) applicability of the framework

and relationships of the three component presences in particular contexts, and (c) use of the CoI framework as an underpinning framework for course or program design or redesign, and for measuring the effect of educational interventions primarily in post-secondary or higher distance, in blended or online formal education settings.

The following tables report quantitative analysis of study sample characteristics:

Table 1

*Study Level of Evidence*

Level of Evidence	Studies	Aggregated Participants	Average Sample Size
LoE 4 - small-sample, single-site qualitative, mixed methods or quantitative studies	14	1,036	82
LoE 3 - comparative, multicourse case studies or large- sample quantitative studies category	7	3,660	610
LoE 5 - descriptive studies and/or self-report stories.	2	0	n/a
LoE 1 - randomized experimental trials or meta-analyses	0	n/a	n/a
LoE 6 - opinion of respected authorities or expert communities	0	n/a	n/a

Table 2

*Geographic Location of Study*

Location	Studies	%
United States	14	61
Canada	4	17
United States and other location	2	9
Other (Switzerland, South Pacific) or not stated	3	13

Table 3

*Research Method*

Method	Studies	%
Quantitative	13	57
Mixed Methods	7	30
Qualitative	2	9
Not clearly stated	1	4

Table 4

*Study Data Collection Method*

Data Collection Method	Studies	%
Survey(ies)	14	61
Discussion forum postings	5	22
Interview(s) or focus group(s)	2	9
Data rubric	1	4
Not stated	1	4

Table 5

*Study Data Analysis Method*

Data Analysis Method	Studies	%
Statistical analysis	12	52
Content or text analysis of discussion postings, open-ended questions, text chats	7	30
Thematic or grounded theory-type qualitative analysis	3	13
Participant group consensus	1	4



Table 6

*Research Population Educational Setting*

Educational Setting	Studies	%
Online	18	78
Blended	2	9
Comparative online to face-to-face	2	9
Not stated	1	4

Table 7

*Research Population Education Level*

Education Level	Studies	%
Graduate	10	44
Undergraduate	8	35
Post-graduate or professional development	5	22
K-12	0	0

Table 8

*Research Population Discipline*

Discipline	Studies	%
Education	10	43
Business	4	17
Computer Science	1	4
Health	1	4
Other (food science, law, English as a second language)	4	17
Not stated or mixed	3	13

Practical applications of the framework ranged from chapters in textbooks for online teachers (e.g., Palloff & Pratt, 2007) and foundations for teacher education programs (e.g., Wilson & Stacey, 2004) to Twitter © and social media integration into classrooms (e.g., Dunlap & Lowenthal, 2009). Research settings included blended, (Ayyavoo, 2013), online (Gorsky & Blau, 2009), and face-to-face (Zhan & Mei, 2013) education, in elementary (Jimoyiannis & Angelaina, 2012), secondary (Dijkers, Whiteside, & Lewis, 2013), post-secondary (Lu & Churchill, 2012), and post-graduate (Han & Hill, 2007) education contexts. Research topics were diverse; topics from the 50 studies included technology affordances (Alamu, Swan, & Schroeder, 2013), homeschooling (Thomson, 2010), business education (Cubric, 2013; Daspit & D'Souza,

2012; Gupta & Bharadwaj, 2013), curriculum design (Ice, Burgess, Beals, & Staley, 2012; Ke & Chávez, 2013), cognitive psychology (Alkali & Amichai-Hamburger, 2004), educational technology (Lambert & Fisher, 2009), and learning flow (Tomberg, 2013).

Challenges associated with accessing this corpus of literature became evident during the pilot study of CoI empirical research articles. As anticipated, the pilot study revealed a wide variety of closed and open publication venues, many requiring subscriptions and passwords, complicating the acquisition of articles for inclusion in research literature reviews. However, the processes developed, documented, and calibrated during the pilot have provided a viable framework for the full study. In particular, the Proforma template form provided very effective for systematic study characteristic recording and database entry. Version 1 of the Proforma template was revised significantly as a result of the pilot study (See Appendix B).

The online database produced during the pilot study has been beta tested and some revisions to the Zotero tagging procedure based on pilot study results are recommended for the full study. This pilot study has been presented to an online research group with encouraging results. The pilot database has already proved useful in answering queries from other researchers seeking specific CoI articles.

### **Summary and Conclusion**

Many significant distance education developments and innovations have occurred since the Garrison et al. (2000) asynchronous, text-based Community of Inquiry study was completed. Some of those developments include widespread adoption of learning management systems (LMS) (WebCT 1997, Blackboard™, Desire to Learn™ 1999, Canvass™, epath™ 1999, Moodle™ 2002); significantly improved synchronous web conferencing and communication media such as Skype™, Macromedia Breeze (now Adobe Connect™) in 2003; improved inter-compatibility between computer operating systems (Sharable Content Object Reference Model or SCORM) in 2004; Connectivism, Facebook™, Web 2.0, social networks in 2005; iPhone™, mobile learning in 2007; massive open online courses (MOOCs); and the Android OS in 2008. Yet, studies based on the CoI framework continue to proliferate. Providing an accessible, organized, tagged database of Community of Inquiry research will support the work of future researchers, practitioners, and policy makers. Categorization of Google Scholar© citations sorted by publication date demonstrate that the CoI framework continues to resonate with educational researchers and practitioners despite these significant evolutions in distance education technology and context (See Appendix A).

Although the volume of studies to be included in the full study will be prodigious, incorporation of software tools such as the Zotero™ online research tool, availability of digital documents with embedded meta-data, online database programs with import and export capabilities, and qualitative research analysis software such as ATLAS-ti™, render the study feasible. In addition, the fact that academic journals now publish in both digital and analogue formats, and have digitized past volumes, facilitates identification and retrieval through online journals and academic publication databases. The practical logistics of identifying and gathering a large body of scholarly literature are significantly easier to address since the advent of Google Scholar©. 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.

This partially completed project adds to the research synthesis knowledge base by demonstrating how emerging digital research tools and processes can be applied in innovative ways to bring order and insights to extensive bodies of literature. The successful pilot calibration and methodological refinement work completed so far has verified the feasibility of the full project, and it is anticipated that the completed research project and the online database will serve as exemplars for sharing open, online research literature resources. Although this particular study centers on the CoI corpus of research, the methodology could be applied to any multi-vocal body of research.

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**Appendix A: Google Scholar Citations**

CoI Chronological Google Scholar© Citations of Garrison, Anderson and Archer (2000) completed March 14, 2014.

Garrison et al., 2000, Seminal Article*	Anderson, et al. Teaching Presence...**	Garrison et al., 2001 Critical thinking...***	Rourke et al., 1999, Assessing Social Presence...****	
Year	Citation Count (Google Scholar© March 14, 2014)			
2001	7	2	3	7
2002	17	21	15	36
2003	33	43	30	50
2004	57	45	40	59
2005	77	62	68	92
2006	91	78	78	83
2007	138	95	106	128
2008	171	107	116	115
2009	178	109	123	143
2010	211	114	110	128
2011	235	107	127	125
2012	275	128	138	112
2013	327	134	135	142
2014	85	30	35	30
<b>Total</b>	1902	1075	1124	1250

- \* 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.
- \*\* Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks*, 5(2), 1-17.
- \*\*\* Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, 15(1), 7-23.
- \*\*\*\* Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *The Journal of Distance Education / Revue de l'Éducation À Distance*, 14(2), 50-71.

## Appendix B: Proposed Study Document Characterization Pro-forma Tool

Author(s) \_\_\_\_\_ Date Published: \_\_\_\_\_  
 Title: \_\_\_\_\_

<p>1. Bibliographic ID (in Zotero™)</p> <p><input type="checkbox"/> Journal article</p> <p><input type="checkbox"/> Journal _____</p> <p><input type="checkbox"/> Database _____</p> <p><input type="checkbox"/> Thesis/Dissertation: Masters Ed.D. Ph.D. Other _____</p>	<p>2. Level of Evidence</p> <p><input type="checkbox"/> LoE1 – trial or meta-anal.</p> <p><input type="checkbox"/> LoE2 – Lit Review or Synth</p> <p><input type="checkbox"/> LoE3 – multi-site</p> <p><input type="checkbox"/> LoE4 – single-site</p> <p><input type="checkbox"/> LoE5 – descriptive</p> <p><input type="checkbox"/> LoE6 – opinion</p>	<p>4. Study Focus</p> <p><input type="checkbox"/> Curriculum design</p> <p><input type="checkbox"/> Development of methodology</p> <p><input type="checkbox"/> Ed. Tech</p> <p><input type="checkbox"/> Assessment of learning</p> <p><input type="checkbox"/> Exploration of relationships</p> <p><input type="checkbox"/> Instructional design</p> <p><input type="checkbox"/> Learning strategies</p> <p><input type="checkbox"/> Review of research</p> <p><input type="checkbox"/> Student retention</p> <p><input type="checkbox"/> Student support</p> <p><input type="checkbox"/> Teacher education</p> <p><input type="checkbox"/> Other _____</p>
<p>5. Type of study</p> <p><input type="checkbox"/> Quantitative methodology</p> <p><input type="checkbox"/> Qualitative methodology</p> <p><input type="checkbox"/> Mixed-method</p> <p>    QUANT-qual</p> <p>    Quant-Qual</p> <p>    quant- QUAL</p> <p><input type="checkbox"/> Meta-analysis or synthesis</p>	<p>6. CoI Components</p> <p><input type="checkbox"/> Entire framework</p> <p><input type="checkbox"/> One presence (identify) TP SP CP</p> <p><input type="checkbox"/> Two presences (identify)</p> <p><input type="checkbox"/> All three presences</p> <p><input type="checkbox"/> CoI concept (identify)</p> <p>_____</p> <p><input type="checkbox"/> Learning experience</p> <p><input type="checkbox"/> Other _____</p> <p>_____</p> <p>_____</p>	
<p>7. Data Collection Method (choose all that apply)</p> <p><input type="checkbox"/> Case study</p> <p><input type="checkbox"/> Survey</p> <p><input type="checkbox"/> Interview</p> <p><input type="checkbox"/> Observation</p> <p><input type="checkbox"/> Digital data collection (LMS)</p> <p><input type="checkbox"/> Other _____</p>	<p>9. Study population</p> <p><input type="checkbox"/> K-12 public school students</p> <p><input type="checkbox"/> K-12 <u>home</u> school students</p> <p><input type="checkbox"/> Undergraduate students</p> <p><input type="checkbox"/> Graduate students</p> <p><input type="checkbox"/> Vocational students</p> <p><input type="checkbox"/> Adult upgrading students</p> <p><input type="checkbox"/> Pre-service Teachers</p> <p><input type="checkbox"/> Practicing Teachers</p> <p><input type="checkbox"/> Professional development participants</p>	
<p>8. Educational setting (choose all that apply)</p> <p><input type="checkbox"/> Distance education</p> <p><input type="checkbox"/> Blended (define components)</p> <p><input type="checkbox"/> Fully online</p> <p><input type="checkbox"/> Face-to-face</p> <p><input type="checkbox"/> Flipped classroom</p> <p><input type="checkbox"/> Formal education (for credit)</p> <p><input type="checkbox"/> Informal education</p> <p><input type="checkbox"/> MOOC</p> <p><input type="checkbox"/> Private School</p> <p><input type="checkbox"/> Public School</p> <p><input type="checkbox"/> Other _____</p>	<p>11. Sample: n = _____</p> <p><input type="checkbox"/> Participants _____</p> <p><input type="checkbox"/> Course(s) _____</p> <p><input type="checkbox"/> Cohort(s) _____</p> <p><input type="checkbox"/> Department(s) _____</p>	
<p>12. Analysis</p> <p><input type="checkbox"/> Multivariate factor analysis</p> <p><input type="checkbox"/> ANOVA</p> <p><input type="checkbox"/> MANOVA</p> <p><input type="checkbox"/> Mean, Mode, Range</p> <p><input type="checkbox"/> Chi-square</p> <p><input type="checkbox"/> SD</p>	<p><input type="checkbox"/> Analysis Cont'd</p> <p><input type="checkbox"/> Cronbach's Alpha</p> <p><input type="checkbox"/> Transcript/content Analysis</p> <p><input type="checkbox"/> Thick description</p> <p>_____</p> <p>_____</p>	



## Author

Dr. Madelaine Befus holds MA in Distributed Learning from Royal Roads University and an Ed.D. from Athabasca University. Madelaine is a passionate researcher, advocate and practitioner of distance and online learning. Her current research interests include refining and testing a proposed framework for more quickly evaluating research adoption levels of use. Email: [madelaine.befus@gmail.com](mailto:madelaine.befus@gmail.com)



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