

DEVELOPMENTAL EDUCATORS' PERSPECTIVES OF ONLINE TEACHING AND
LEARNING WITHIN A COMMUNITY OF INQUIRY FRAMEWORK

by

Holly B. Shinn, AAEE, AACIS, BAAS, M.Ed

A dissertation submitted to the Graduate Council of
Texas State University in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
with a Major in Developmental Education
May 2023

Committee Members:

Jodi Holschuh, Chair

Taylor Acee

Sonya L. Armstrong

Douglas Holschuh

COPYRIGHT

by

Holly B. Shinn

2023

FAIR USE AND AUTHOR'S PERMISSION STATEMENT

Fair Use

This work is protected by the Copyright Laws of the United States (Public Law 94-553, section 107). Consistent with fair use as defined in the Copyright Laws, brief quotations from this material are allowed with proper acknowledgement. Use of this material for financial gain without the author's express written permission is not allowed.

Duplication Permission

As the copyright holder of this work I, Holly B. Shinn, authorize duplication of this work, in whole or in part, for educational or scholarly purposes only.

DEDICATION

I dedicate this document to all of those who supported me from this earth and in heaven.

ACKNOWLEDGEMENTS

Words cannot express the gratitude that I feel towards all who guided, assisted, encouraged, and supported me along my academic journey, however I would like to try. First, I would like to express my deepest appreciation for the instruction, guidance, and support provided by my professor and advisor Dr. Jodi Holschuh. Without Dr. Holschuh I wouldn't have taken this journey and accomplished the goals, gained the skills, and grown cognitively and intellectually. I want to also give major thanks of gratitude to the rest of my dissertation committee members Dr. Taylor Acee, Dr. Sonya L. Armstrong, and Dr. Douglas Holschuh. I am deeply grateful for Dr. Taylor Acee who taught and guided me in psychometric and statistics. I deeply appreciate and thank Dr. Armstrong for all her instruction, guidance, support, and lessons on teaching and learning within postsecondary education. Finally, I would like to offer a deep gratitude to Dr. Doug Holschuh for introducing and guiding me in instructional design, online course design, and with instructional technology. Thank you, committee, I am forever grateful.

Second, I would like to give special thanks to several of my colleagues who also played a key role in my journey. I am extremely grateful for Dr. Meagan Hoff and Allie Crawford for helping me with my research. I am deeply indebted to Meg Taylor for offering feedback on the writing phase of my dissertation. I am also deeply indebted to Dena Guerrero for making sure all documents were prepared and filed correctly and on time.

Third, I would like to thank all my professors, and colleagues who inspired, taught, and supported me on my journey, especially cohort #5. Thank you for your encouragement, feedback, and friendships.

Fourth, I would like to thank all of those who provided me with the data to finish the final leg of my journey. Thanks to all who participated in my study.

Fifth, I would like to thank all my friends and family who prayed, loved, and supported me throughout this journey, especially my husband Alan Shinn and daughter Savannah Shinn where this journey was as much theirs as mine. I first want to thank my husband Alan for taking this journey with me and being my foundational, emotional, and financial supporter. I have no words to express the gratitude I have for you and for the unconditional love and unwavering support as we traveled this road together. Next, I want to thank Savannah. Thank you for sharing your school years with your professional student mom and being there when I needed you. You have inspired me in many ways and served as a lifeline so many times during my journey. Again, thank you for keeping me grounded.

Six, I owe a deep thanks to my parents and siblings (which includes in-laws) for being my biggest fans and moral supporters. Thank you, Glenna Gould (mom) I have no words to express the gratitude I have for the support that you have given me throughout my educational journeys. Dad, (Kenneth Bench) I wish you could have been here to see me finish, but I know you are cheering for me at heavens gates with Leeon and Leonard. Leeon, Shavon, and Simon and family, I also thank you for your support and love

through this journey. Finally, I want to thank Carolyn and Leonard Shinn and all the rest of the Shinn clan. Thank you for your awesome prayers, love, and support as I completed my educational journey. Thanks to my family and friends not mentioned by name. I want you to know that you were important in my journey as well. I appreciate all the love and support.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	v
LIST OF TABLES	xi
LIST OF FIGURES	xiii
LIST OF ABBREVIATIONS.....	xiv
ABSTRACT.....	xv
CHAPTER	
I. INTRODUCTION	1
Statement of Problem.....	2
Purpose of Study	3
Research Questions	3
List of Abbreviations	5
Definition of Terms.....	5
Chapter Summary	8
Organization of Study	9
II. REVIEW OF LITERATURE.....	10
Background of Online Education.....	10
Community of Inquiry- Conceptual Framework	12
Teaching Presence	14
Social Presence	16
Cognitive Presence.....	18
Measuring Community of Inquiry - Instructor Perspective	21
Criticisms of the Community of Inquiry Theory	23
Online Instructor Roles	25
Role of Online Technologist.....	25
Role of Online Course Designer	33
Role of Online Teacher	35
Gaps in Literature	50

Chapter Summary	52
III. METHODOLOGY	54
Research Design.....	54
Research Questions.....	55
Participants.....	56
Research Method	61
Materials	61
Data Collection	69
Online Data Collection Survey	69
Timeline	70
Data Analyses	70
Processing Data.....	71
Preliminary Analyses	73
Primary Analyses	77
Controlling for Inflation of Type 1 Error.....	82
Descriptive Analyses	82
Open Coding	83
Data Validation Method.....	84
Limitations	86
Sample Size.....	86
Researcher Bias.....	88
Summary of Chapter	88
IV. RESULTS	90
Preliminary Analyses Results	91
Online Learning Environments and Course Subjects	91
Pedagogical Practices of Engaging in Student Online Discussions	93
Online Communication Methods.....	94
Groups.....	95
Exploratory Factor Analyses.....	96
Normality Tests.....	104
Primary Analyses Results	107
Research Question 1	107
Research Question 1a.....	108
Research Question 1b	111
Research Question 1c.....	116
Research Question 2	117

Research Question 3	118
Research Question 4	124
Research Question 5	137
Chapter Summary	147
V. DISCUSSION	150
Discussion of Results	151
Differences in DE Online Learning Environments.....	151
Shift in Communication Methods.....	156
Adaptive Teaching	156
Building Relationships.....	159
Effects of COVID-19 on Teaching and Student Learning.....	159
Implications.....	163
Future Research	165
Chapter Summary	167
APPENDIX SECTION.....	169
REFERENCES	194

LIST OF TABLES

Table	Page
1. Demographic Profile Frequency Table	58
2. Research Questions and Analyses	78
3. Frequency Table of Online Learning Environments	92
4. Frequency Table of Instructor Engagement in Student Discussions	93
5. Frequency Table of Online Communication Methods.....	95
6. Profiles with Groups and Group Memberships	96
7. EFA 1: Teaching Presence Scale	99
8. EFA 2: Social Presence Scale	101
9. EFA 3: Cognitive Presence Scale	103
10. Community of Inquiry Scale Test of Normality	105
11. Demographic: Years Teaching Online Group Test Statistics	109
12. Demographic: Age Group Test Statistics	110
13. Demographic: Years Teaching DE Group Statistics	110
14. Learning Environment: COVID-19 Group Test Statistics.....	112
15. Learning Environment: Course Delivery Group Test Statistics	113
16. Learning Environment: Learning Institution Group Test Statistics.....	114
17. Learning Environment: Corequisite Group Test Statistics	115
18. Correlations: COI Subscales and Engagement in Student Online Discussions	116
19. Group Differences on Frequency of Engagement in Student	118
20. Group Percentages: Methods of Communicating Course Information.....	120
21. Group Percentage: Methods Used When Providing Student Feedback.....	122
22. Group Percentage: Methods Used When Engaged in Student Discussions	123

23. Student Engagement with Course Resources	125
24. Student Engagement in Meaningful Discussions	129
25. Creating Relationships and Sense of Community	133
26. Effects of COVID-19: Categorized Groupings and Descriptions.....	138

LIST OF FIGURES

Figure	Page
1. Community of Inquiry Model.....	14
2. Boxplot: Community of Inquiry Scale.....	106

LIST OF ABBREVIATIONS

Abbreviation	Description
LMS	Learning Management System
COI	Community of Inquiry
DE	Developmental Education

ABSTRACT

This study explored the perceptions of sixty-five developmental education instructors who taught mathematics, reading/writing, English, learning frameworks, or corequisite online courses. Community of Inquiry was used as a conceptual framework to guide analyses. Nonparametric tests revealed statistically significant differences on course structure (teaching presence), comfort of engagement (social presence), and resolution (cognitive presence) between instructors prepared for online instruction and participants who transferred online due to COVID-19 (emergency remote). Statistically significant differences were also found between participants who taught asynchronous and synchronous instruction (mostly emergency remote) on comfort of engagement. Open coding results revealed participants who taught synchronous instruction endured more challenges than successes when trying to get students to engage in online discussions. Results implied effective online instruction may require educators to constantly change teaching practices to meet student needs. Also, preparedness for online teaching may influence online success. Recommendations for future research are discussed.

I. INTRODUCTION

Online instruction that includes opportunities for interactive learning activities where instructors and students engage in discourse may have an influence on student learning (Hurt et al., 2012). Research suggests that educators in postsecondary education who teach online and include elements of teaching, social, and cognitive presence within their online learning environments may enhance the quality and experience of the participants within the online learning environment (Rockinson-Szapkiw et al., 2016; Zhang & Mercado, 2023). Many online educators use discussions to create interactive and engaging online learning environments (Lee & Recker, 2021). Also, instructors may influence student success in online learning environments when engaging in discussions with students (Van Braak et al., 2022). Instructor engagement in student activities should be an integral part of online instruction, especially in developmental education online learning environments (Burgess & Caverly, 2010; Jaafar, 2015; MacDonald & Caverly, 2000; Sattler, 2005) because discussions allow instructors to identify students who may need extra support with learning (Brooks & Young, 2015). Students who enroll in DE online courses may need extra help when learning online due to the nature of online learning environments. Online success requires students to be self-regulating their time, self-motivation (Cho & Heron, 2015), overcoming fears, and anxieties of learning (Kim & Hodges, 2012; Taylor, 2008) because students may withdraw or drop out more than students who are enrolled in in-person DE courses where instructors are present and engaging in discourse with students (Cung et al., 2019; Francis et al., 2019; Jaggars et al., 2013). An instructor's choice of teaching and engagement practices may play an

important role in student success (Rockinson-Szapkiw et al., 2016; Zhang & Mercado, 2023).

Statement of Problem

Current research fails to offer a complete picture of teaching and learning within DE online learning environments. Little is known about postsecondary online DE instructors, their roles in online DE classrooms (i.e., mathematics, reading, writing, English, learning frameworks, and corequisite), and how they perceive online teaching and learning. Research was limited, which studied online instructors, their teaching practices of developmental educators, how they perceived online teaching and learning, and if DE online learning environments reflected the COI framework of teaching (teaching presence) and learning (social and cognitive presence). Previous research that used COI as a conceptual framework focused on student perspectives of online learning, which included rating satisfaction levels with the instructor's performance, course structure, learning with peers (Arbaugh et al., 2008), and by coding discussion dialogue held between instructor and students in asynchronous courses (Garrison et al., 1999). Little research has been conducted that focused on DE online environments and if instructors use discussions in their online instruction. Even though there were a few studies conducted in the field of DE that mentioned online discussions (Ironsmith et al., 2003; Sattler, 2005), discussions were not the focus of those studies.

A more in-depth picture of DE online learning environments is needed, especially when making sound decisions about online programs, instruction, and student success. “Unless educators become fully aware of the factors that foster student achievement in diverse class settings and with different tools, their attempts to make such technologies

available may prove futile” (Spence & Usher, 2007, p. 284). Knowing how instructors provide instruction to their online students and methods they found effective in influencing student learning and success could be valuable information for policy makers, course designers, professional development coordinators, and other educators.

Purpose of Study

The purpose of this study was to explore the DE online learning environment through the perspectives of the educators teaching DE online instruction. I wanted to know how DE instructors perceived their online learning environments as it pertained to the Community of Inquiry (COI) framework (i.e., teaching, social, and cognitive presence) (Garrison, 1993). I wanted to identify effective teaching practices and communication methods used by DE online instructors when communicating course information and engaging students in the online learning experience. I also wanted to know how DE online instructors perceived teaching and learning during a pandemic (COVID-19) and if the experience changed their views of online teaching and learning.

Research Questions

Answering the following research questions will not only add to the extant literature in the field of DE about online learning environments but will also provide updated information for those who make informed decisions in the field of DE, especially those interested in course design, technologies, teaching practices, and student support. Offering a more complete and clearer picture of online DE online learning environments in postsecondary education, where other people (e.g., instructor, tutor, and students) are engaged in the learning process, could be valuable information for online educators, course designers, program directors, and institution administration.

This study included the following research questions:

1. How does the COI framework describe instructor perceptions of online teaching within developmental education courses?
 - a. How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?
 - b. How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?
 - c. How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?
2. What are the differences in levels of engagement in student discussion by demographic group and learning environment?
3. What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?
4. What successes and challenges do online developmental educators encounter in their online courses?
5. How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?

List of Abbreviations

This study used several abbreviations. The abbreviations and explanations of abbreviations are as follows.

Learning Management System (LMS). LMS is a technological tool used by learning institutions as a course management system where users can choose between a menu of various electronic tools to organize and present course structure, content, learning materials, provide feedback, and assessments (Natow et al., 2017). Blackboard, Canvas, Moodle, WebCT, and Desire2Learn are examples of different LMS products used in higher education.

Community of Inquiry (COI). COI is the conceptual framework used in this study. COI includes social, cognitive, and teaching presences and is used by educators as a guide when designing interactive and engaging online learning environments (Garrison et al., 2000).

Developmental Education (DE). DE is a term used in education to describe educational programs that assist students with learning basic concepts in mathematics, reading, writing, and English. In this study DE includes mathematics, reading, writing, English, learning frameworks, and corequisite courses paired with a basic concept course (Cung et al., 2019).

Definition of Terms

There were many terms associated with online learning environments used throughout this paper. A list of terms and their definitions associated with online learning follows.

Asynchronous course. In this document, the term asynchronous, used in unison with learning environments, course delivery methods, and types of discussions, refers to the instructors and students separated by time and space (Trenholm 2009) where there typically are no face-to-face interactions (Allen et al., 2013). Students and instructors can access the online course twenty-four hours a day and gain access anywhere there is an internet connection. Asynchronous courses, asynchronous learning environments, and asynchronous discussions are in a written format with little to no scheduled face-to-face or in person meetings.

Community of Inquiry. Community of Inquiry is a conceptual framework used by researchers to identify high order learning in online courses (Arbaugh, et al., 2008; Garrison et al., 2000). Community of inquiry, grounded in the theory of social constructivism, includes three interconnected components—social, cognitive, and teaching presence—that educators can use as a guide when designing interactive and engaging online learning environments (Garrison et al., 2000).

Cognitive presence. The cognitive presence component of the COI framework is defined as the reflective and purposeful nature of collaborative knowledge construction acquired through engaging in constructivist educational experiences (Arbaugh et al., 2008).

Developmental education courses. Developmental education courses are courses that students enroll in where they learn skills they may not have developed in previous educational experiences, which can include basic skills in mathematics, reading, writing, English, all needed to succeed in college-level instruction (Bailey et al., 2010).

Facilitation of student learning. Facilitation of student learning or learning activities refers to the methods used by instructors to teach, guide, assess, and support students learning (Nandi et al., 2012).

Online, e-learning, and distance learning. In this document, online, e-learning, and distance learning share the same definition and are used to describe the learning environments. The terms, defined as courses taught “wholly” online (Moore et al., 2011, p. 130) or at least 80% of the course (Allen et al., 2013) and accessed through digital format using the internet (Nandi et al., 2012).

Remote learning and emergency remote learning. Remote learning, a phase stemmed out of COVID-19 and defined as “the transformation from the conventional teaching mode of delivery to the distance learning mode of delivery due to external forces” (Meletiou-Mavrotheris et al., 2022, p. 2).

Social presence. The social presence component of the COI framework is defined as the ability of course participants to identify with others in the learning community through the engagement of purposeful communication which leads to the development of interpersonal relationships and the projection of individual personalities (Arbaugh et al., 2008).

Synchronous courses. Synchronous is defined as existing or occurring at the same time (Merriam-Webster Dictionary, n.d.). Synchronous in this paper referred to learning environments, courses, and type of discussions that used an electronic format and the internet to connect instructors and students at a set scheduled time for “real-time” course delivery (MacDonald & Caverly, 2000).

Teaching presence. The teaching presence component of the COI framework is defined as the design and organization of course structure, the facilitation of student discourse, the direct instruction, and feedback, which are required to shift social presence to cognitive presence (Lam, 2015).

Chapter Summary

In this chapter, I first provided an overview of the problem and rationale for investigating the problem this study addresses. Little is known about instructors, their roles, and effectiveness of discussions in online DE courses. Second, I provided a brief description of the purpose of the study. This study explored instructor communication methods, and the perspectives of the instructor of online teaching and learning in various online learning environments to understand their effectiveness. Third, I conveyed how research was limited and a need for an up-to-date picture of DE online learning environments and instruction was needed to understand student learning. Fourth, a brief discussion about COVID-19 was provided. Perspectives from instructors can add insight into different teaching practices employed when transferring to online teaching and learning. Fifth, five research and three sub-questions were introduced that when answered will provide a more valid picture of online DE teaching practices, successes, and challenges of teaching and learning online. Lastly, a list of abbreviations and definitions of terms were provided.

The information gained from this study would contribute to literature and research in online DE and to the theory of COI. My research can be used to inform and guide practitioners, course designers, professional development coordinators, and

postsecondary education officials when making informed decisions about teaching and student learning in online developmental learning environments.

Organization of the Study

Chapter 2 provides a literature review, which includes a discussion on the conceptual framework used in this study and a discussion on the role of the online instructor. The chapter also includes a discussion on gaps in the research that examines DE online learning environments. Chapter 3 provides the research design, data collection method, analyses used in the study, and includes limitations of the research design. Chapter 4 reports on results found during preliminary (i.e., analyses used to ready data for primary analyses) and primary (i.e., analyses used to answer research questions) analyses. Chapter 5 discusses the results and implications of the study's results and provides direction for future research.

II. REVIEW OF LITERATURE

In this chapter, I provide an in-depth review of literature on research conducted in postsecondary education focused on teaching and learning in online environments. Students learning in postsecondary online environments can feel like they are learning in isolation, especially when those environments have limited opportunities for student-student or student-instructor engagement. This review focuses on research that discusses the progression of online/distance education, roles of online educators, and the influences of instructors on student learning. First, I start with a brief history on the background of postsecondary online/distance education. Second, I provide the theoretical frameworks used to guide this study, which includes a discussion on COI instrumentation. Third, I provide an in-depth look into past research conducted on teachers' roles in online courses, followed by discussion methods used in online courses and types of discussions. Fourth, factors affecting student engagement in online discussions are discussed. Finally, I discuss the gaps found in the research and a list of the questions that remain unanswered, which are the basis of the research questions used in this study.

Background of Online Education

Online education first started as written exchanges of information between instructors and students in the pre-digital era. Pre-digital courses were taught delivered using mail services and were referred to as distance education or correspondence courses (Pregowska et al., 2021). Distance education course delivery progressed from mail to radio, radio to television, and then to video tapes (Pregowska et al., 2021). Distance education courses changed with the availability of the desktop personal computers, where courses were conducted through exchanges of information from teachers and students

using removable magnetic storage media (i.e., floppy disk) and then later moved to compact disc read-only memory (CD ROM) (Pregowska et al., 2021).

Due to the advancements in technology, the birth of the internet (World-Wide-Web), and learning management systems (LMS), today asynchronous courses are conducted over an LMS (Cavus et al., 2022). Asynchronous courses allow students the flexibility to work on the courses at any time as they typically do not have a fixed meeting time or any face-to-face interactions (Allen et al., 2013). An LMS is an online program with tools (e.g., content, resources, assignments, and assessments) used in online teaching and learning (Cavus et al., 2022).

Distance education progressed to include synchronous courses. Synchronous courses are online courses that use the internet and videoconferencing platforms (Kies et al., 1997) such as Microsoft Teams, WhatsApp (Correia et al., 2020), Skype (Hrastinski et al., 2010), and Zoom (Greenhow et al., 2022; Pregowska et al., 2021) to conduct class. Synchronous courses are like in-person learning environments where the class meets at a set scheduled time and teachers and students see and hear each other using microphones and cameras to communicate and conduct class (Graham, 2019; Phelps & Vlachopoulos, 2020).

The advancements and adoption of technology in education raised concerns about the quality of online education early in the history of online education (Garrison, 1993). Concerned with the quality of asynchronous online education, Garrison (1993) researched conversations between course participants enrolled in online postsecondary teleconferencing courses (e.g., instructors, students, and guest speakers) to see if online learning was beneficial. The study conducted by Garrison's (1993) led the authors to

develop a theory about online learning in asynchronous courses called COI, which identified elements of learning in online discussions between instructors and students enrolled in telecommunication conference courses. The COI framework is used today in research as a conceptual framework to understand not only online teaching and learning in asynchronous environments but online synchronous environments as well (Rockinson-Szapkiw et al., 2016; Zhang & Mercado, 2023).

Community of Inquiry Framework

This study used the COI framework as a lens to understand teaching and learning within DE online learning environments. The COI framework stemmed out of principles of social constructivism (Arbaugh et al., 2008) but differs in scope and emphasis. COI is a conceptual framework that has been used as a guide in online educators to understand elements in online learning environments that contributes towards knowledge construction (Garrison, & Cleveland-Innes, 2005; Kilis & Yildirim, 2018; Lam, 2015; Richardson & Lowenthal, 2017; Shea & Bidjerano, 2009).

The COI framework is rooted in social constructivism but differs in scope and emphasis. Social constructivism proposes that “constructivist epistemology rests on the assumption that people construct meaning actively in situated contexts of social interaction, involving a complex range of factors such as language, history, and ideology” (Levy, 2003, p. 93). COI theorists propose that “knowledge is a social artifact” and, in education, it is the product of the collaboration between teacher and students (Garrison, 1993, p. 202). Knowledge is constructed when online courses are designed with opportunities for course participants (i.e., students, instructors, and others) to engage in meaningful social and academic conversations (Akyol et al., 2010; Garrison, 1993;

Garrison et al., 1999; Garrison et al., 2000; Richardson & Lowenthal, 2017). New knowledge is created when instructors and students equally contribute to active discussions and engage in deliberate conversations (Garrison, 1993). When students collaborate to solve problems they share ideas, fears, anxieties, individual experiences, as well as personal information (Garrison, 1993; Garrison et al., 1999; Garrison et al., 2000; Garrison et al., 2010), which can influence their perceptions of learning. Online student outcomes may also increase when engaged in problem-solving discussions compared to discussions that lacked problem-solving opportunities (Sadaf et al., 2021). When comparing academic performance and cognitive presence between graduate students enrolled in instructional design courses Sadaf et al. (2012) found that student outcomes were higher for students engaged in problem-solving discussions compared to students in courses that had discussions focused on problem-solving.

The COI framework includes three interrelated main constructs (i.e., teaching presence, social presence, and cognitive presence), which are supportive of each other. These three foundational constructs are essential to understanding online teaching and learning and should be present within the online learning environment to maximize learning experiences (Akyol et al., 2010; Garrison, 1993; Garrison et al., 1999; Garrison et al., 2000; Richardson & Lowenthal, 2017).

The COI model (see Figure 1) was derived from the COI framework and serves as a guide for educators when designing, developing, and studying online instruction. Educators have used the model when designing online learning environments; ensuring course environments contain learning activities that include teaching presence (e.g.,

teaching moments), social presence (e.g., sharing personal self), and cognitive presence (e.g., learning activities that promote and support deep thinking).

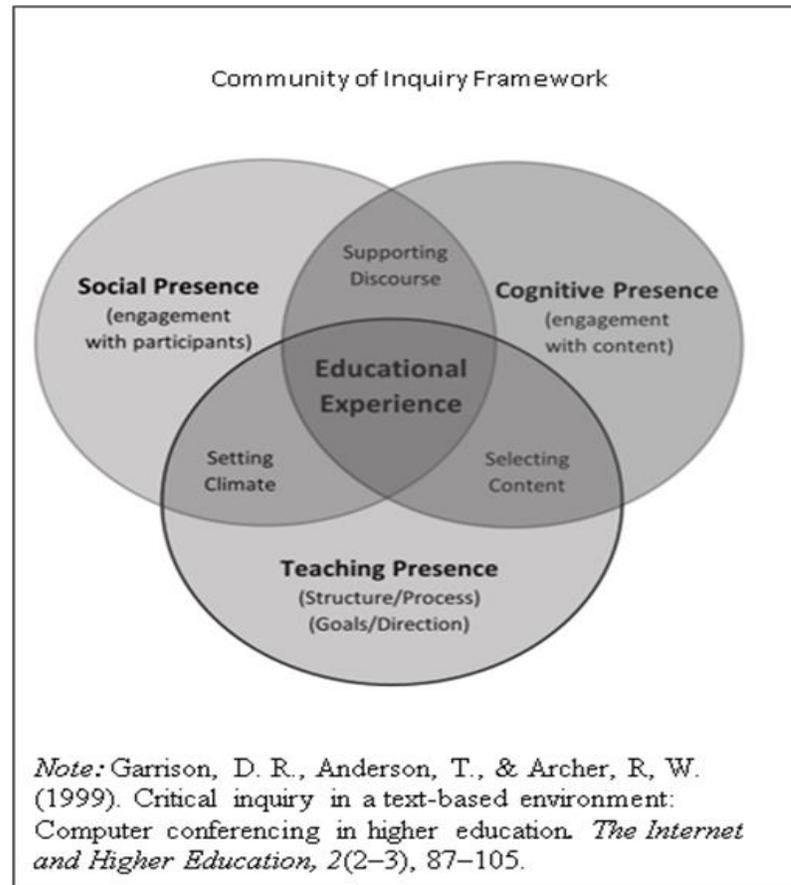


Figure 1. *Community of Inquiry Model*

Teaching Presence

Teaching presence includes three elements, the organization of course materials and resources (course structure), facilitation of learning activities, and direct instruction and feedback. Facilitation of learning activities may include active interventions by instructors, which draws in the less active participants. Examples of interventions could include acknowledging individual contributions from students when making appropriate contributions towards discussions, or aiding students in creating a group consciousness through a shared meaning, which helps students reach understanding (Garrison et al.,

2000). The last element in teaching presence includes direct instruction and feedback, which are associated with providing learning materials and instructions as well as the assessment of student learning activities. Instructors present content in the course and learning activities (e.g., discussions) and actively question and guide students towards understanding, by offering constructive and explanatory feedback, based on the instructor's personal beliefs and experiences (Garrison et al., 2000). Teaching presence also supports the constructs of social and cognitive presence through the design and facilitation of COI activities (e.g., discussions, and collaborative projects).

Teaching presence usually falls on the responsibility of the instructor, but students and other participants (e.g., tutor, and guest speakers) can also provide the teaching moments (Garrison et al., 2000; Yukselturk & Yildirim, 2008), where teachers learn from students and students learn from teachers and peers (Garrison et al., 2000; Richardson & Lowenthal, 2017).

COI was used as a conceptual framework by Zhang et al. (2022) to understand the effects of teaching presence on cyberloafing using convenience sampling. Cyberloafing is the act of students using the internet for purposes unrelated to instruction in the courses (Zhang et al., 2022). The focus of their study was to test sequential mediating roles of social presence and cognitive presence for the lack of attention and moderating roles for normative influence in video-centric asynchronous online courses. Normative influence was defined as “the extent to which students feel pressure from people close to them (e.g., friends and classmates) to use the internet and internet-based technologies for non-learning purposes during the courses” (Zhang et al., 2022, p. 1654). Zhang et al. (2022) surveyed 814 Chinese university students with an adopted scale from Law et al. (2019) to

measure learners' perception of teaching and social and cognitive presence. They found that when teaching presence was high, cyberloafing was low and when teaching presence was low, cyberloafing was high. Zhang et al. (2022) suggested that teaching presence was crucial in maintaining students' attention and could impact cyberloafing through the sequential mediating effects of social and cognitive presence. The study was conducted in asynchronous settings, and it is unclear whether these results would be gained within a synchronous learning environment.

Social Presence

Social presence pertains to the ability of online course participants to project themselves as “real people” (Garrison et al., 2000, p. 89). The main function for social presence is to support cognitive presence through engagements of critical thinking activities when learning with others (Garrison et al., 2000). Social presence occurs when online instruction includes opportunities for all course participants to engage in discourse as a community (Bozhurt, 2017; Garrison, 1993; Garrison et al., 2000; Zydney et al., 2012). Indicators of social presence include open communication, group cohesion, and affective expression (Arbaugh et al., 2008). Social presence can be identified in oral and or written discussions where course participants openly share (i.e., open communication) in conversations with others and there is group cohesion (e.g., group identity), which is obtained through the sharing of emotions (Arbaugh et al., 2008). Affective expression includes affective responses (e.g., the sharing of emotion, humor, and self-disclosure), interactive responses (e.g., acknowledging contributions to the discussion and or expressing appreciation), and cohesive responses (e.g., greetings and salutations) (Lowenthal & Dunlap, 2020).

Social presence was also studied by Zydney et al. (2012) who focused online teaching protocols and student engagement in online asynchronous discussions. A quasi-experimental study using 26 graduate students enrolled in two different courses (i.e., science and technology) that were taught by the same instructor who had seven years of teaching experience, two with teaching fully online. The focus of the study was to compare two separate online teaching protocols using Garrison et al.'s (2000) coding template for the COI as a guide to understand student and instructor perspective of their online teaching and learning experiences. For one group of students, the protocol required students to choose a passage from the text for a discussion topic, while the second group of students followed a protocol that was more structured. The second group of students were provided the topics for discussion. For social presence, Zydney et al. (2012) did not find any notable differences between the two groups of students but suggested there was a slight difference between groups on social presence – open communication. The students in the *choose your own topic* group had discussions that were mostly nice comments, but no real conversations took place. The other group of students directly addressed their peers by name in their post and would tell stories, which included personal information (e.g., work, school, or home life). The instructor conveyed that teaching was more challenging when students got to choose their own topic, due to discussions going in too many directions. The instructor in the study found that structured discussions were easier to follow, unstructured discussions went in too many directions, making it a challenge to follow all the discussions (Zydney et al., 2012).

The study conducted by Zydney et al. (2012) included the perspective of one instructor, who was also the first author of the article, which creates a question for the

reader on the personal influence that the instructor had on the study's results and views of social presence. Also, because the study included both asynchronous discussions and graduate students enrolled in science and technology courses, one must wonder if the same study would get comparable results in other settings (e.g., undergraduates, synchronous, remote emergency, or DE).

Cognitive Presence

Cognitive presence is the extent to which course participants co-construct knowledge through reflective inquiry, group cohesiveness, and purposeful communication (Bozkurt, 2017; Garrison, 1993; Garrison et al., 2000; Garrison et al., 2010; Zydney et al., 2012). Cognition occurs when course participants engage in critical thinking activities through continued communications when defining problems, exploring relevant information, integrating ideas, and/or testing for plausible solutions (Garrison et al., 2000). Cognitive presence includes four indicators: triggering event, exploration, integration, and resolution. Triggering events are catalysts for cognitive presence. Examples of triggering events are well thought-out prompts which promote deep thinking (e.g., discussions, group projects, debates, and reflective feedback). The second indicator of cognitive presence is exploration, which includes the exploration of course materials, information, and feedback. The third indicator of cognitive presence is integration and pertains to the knowledge gained from interacting with a triggering event and the result of the exploration activity. The fourth indicator of cognitive presence is resolution and includes the ability to transfer knowledge gained to other aspects of academia or life (Garrison et al., 2000).

Cognitive presence in research focused on measuring relationships between students' performances and ability and, at times, personal perspective of online learning. For example, Doo et al. (2023) studied 1435 undergraduate students from Korea during COVID-19 who were enrolled in three different online learning environments (i.e., fully online, hybrid, and in-person courses) using instruments known in education such as Motivated Strategies for Learning Questionnaire scale (Pintrich & de Groot, 1990; Pintrich et al., 1991), COI instrument (Arbaugh et al., 2008), and Engaging Learning Index (Schreiner & Louis, 2011) to measure self-efficacy, self-regulation, cognitive presence, teaching presence, and learning engagement, respectfully. Students in the study ranged from first-year students to seniors at a four-year university. Structure equation modeling for analysis revealed a positive relationship between self-efficacy and teaching presence. Cognitive presence and self-efficacy were related to self-regulation. They did not find a relationship between self-efficacy and learning engagement but suggested that self-efficacy and learning engagement were mediated by teaching presence, cognitive presence, and self-regulation. Doo et al. (2023) also found that self-regulation had a positive relationship with cognitive presence and learning engagement and that teaching presence had a positive impact on cognitive presence. They also suggested that teaching presence and cognitive presence did not impact learning engagement, but that cognitive presence mediated the relationship between teaching presence and learning engagement. This study only looked at students' perspective of learning and does not explain the relationships between teaching presence and cognitive presence, just suggests that there was a relationship.

Garrison and Cleveland-Innes (2005) found that graduate students strategized their approaches to learning (e.g., deep, surface, or achievement). A student's learning approach was strongly influenced by the instructional design, teaching approach, and teaching presence, which contributed to the adoption of deep. The study conducted by Garrison and Cleveland-Innes (2005) included four courses delivered asynchronously with various levels (e.g., low, medium, and high) of teacher engagement, interaction, and reflective assignments. The results indicated that interaction did not promote deep learning. Courses that had little or no instructor involvement had either no shift in deep learning or showed a drop in deep learning. Courses that were designed for critical deep learning and included focused critical discourse showed a significant shift in deep learning. The course that had a considerable amount of interaction, but no critical discourse had low student scores. Lastly, the course that had considerable instructor engagement showed no shift to deep learning. Due to the finding in their study, Garrison and Cleveland-Innes (2005) suggests that social presence was needed to establish deep learning and associated with levels of student interaction. Their study only included graduate students and the reader must question if the same holds true for undergraduate students, students who are hesitant or shy when asked to engage in discussions, or students who may not have strong self-regulation skill and need a strong instructor presence might have different results (Horzum, 2015). Also, the study only examined students in asynchronous discussions and did not look at other learning environments. Instructors teaching and students enrolled in online synchronous, or emergency remote courses may have different views of learning (Zhang et al., 2022).

Measuring Community of Inquiry - Instructor Perspective

Instructors may need a reliable method to measure how their teaching practices are affecting student learning in real-time, which may be beneficial for students enrolled in online courses (Brookfield, 2015; Sattler, 2005). Brookfield (2015) suggests that instructors should use a critical incident questionnaire to assess what is working and meeting students' needs at least several times a semester. Samuel and Conceição (2022) used the Critical Incident Questionnaire (CIQ) as an effective formative evaluation tool to provide a real-time valuation of course design and course delivery methods. The instrument had five questions which instructors provided to students to fill out: "1) At what moment in the class this week were you most engaged as a learner? 2) At what moment in the class this week were you most distanced as a learner? 3) What action that anyone in the room took this week did you find most affirming or helpful? 4) What action that anyone in the room took this week did you find most puzzling or confusing? 5) What surprised you most about this class?" (Samuel & Conceição, 2022, p. 154). The problem with the instrument in this study was that the instructors had to code the students' responses for all five questions each week, which can be time consuming, and identifying students' needs can be an arduous task.

Much research examines the students' perspectives and not instructors' perspectives of a COI, which uses the instrument introduced by Arbaugh et al. (2008). COI instrument has 34-statements that measure students' perspective of teaching presence, social presence, and cognitive presence using a four-point Likert scale. No instrument has been found to date that measures instructor perspectives of social, and cognitive presence; however, Gurley (2018) adapted Arbaugh et al.'s (2008) COI

instrument to measure instructors' perspectives on teaching presence. The instrument was piloted by Gurley (2018) using 86 instructors teaching undergraduate and graduate online and hybrid courses. Course design and organization, facilitation of student learning activities, and direct instruction and feedback were analyzed using a factor analysis. The results showed design and organization, and the facilitation of student learning activities as constructs of teaching presence, but the results did not recognize direct instruction as an individual construct. Therefore, questions on direct instruction and feedback were removed from analysis (Gurley, 2018). The content analysis conducted by Gurley (2018) revealed that there were differences between certified online instructors and uncertified instructors. The differences implied instructors who were certified in online teaching were more confident in their abilities to facilitate student discussions compared to those who were not trained in online teaching techniques. Additionally, Gurley (2018) asked instructors to explain how they implemented teaching presence in their courses. Three categorized groupings emerged: design and organization, facilitation, and indirect instruction. Themes for teaching behaviors on design and organization included creating a course syllabus, utilizing learning management system tools, providing a course orientation video, emailing, phone calling, and videoconferencing for sending out reminders. Themes for facilitation of learning included giving timely feedback to students, assigning group projects, and creating course assignments. Themes for direct instruction included providing constructive feedback, looking at student-instructor participation in discussion forums, and assigning guided and active learning assignments. Gurley's (2018) study only examined teaching presence and omitted social and cognitive presence. However, all three elements (teaching, social, and cognitive) are essential

elements of learning online, and, when present in online courses, can help maximize student learning (Garrison et al., 1999).

Criticisms of the Community of Inquiry Theory

Most researchers who studied COI framework agreed on the three foundational elements of COI were important in understanding online learning. However, a few researchers believed the theory was incomplete, out of date, and did not consider other potential constructs which reflect the changes and nuances found in a more modern online learning environment (Kilis & Yildirim, 2018; Lam, 2015; Richardson & Lowenthal, 2017; Shea & Bidjerano, 2009). The COI framework predates learning managements systems and does not include other constructs found in online learning. (Shea et al., 2022).

Scholars believe that online learning theory should include instructor-social presence. Instructor-social presence was first studied by Wise et al. (2004) and then later by Richardson and Lowenthal (2017). Instructor-social presence is the act of instructors' sharing their personal self with students when engaged in student discussions, giving feedback, or providing direct instructions. Indicators for instructor-social presence included immediacy of feedback, cues from facial expressions, voice tones, and social indicators, which included empathy and humor (Richardson & Lowenthal, 2017). Wise et al. (2004) studied social presence in asynchronous self-paced courses among in-service teachers and their elementary-school students and found that instructors can impact the social engagement of students, which could affect the satisfaction of student learning. Learning happened when online instructors provided immediate responses and shared personal intimate moments with their students (Richardson & Lowenthal, 2017).

Students' emotions towards their instructor and online learning environments were related to instructor – social presence and the instructors' ability to immediately respond to students (Brooks & Young, 2015).

Another amendment to the COI framework was introduced by Shea and Bidgerano (2009), who suggested that learning presence should also be considered. Shea and Bidgerano (2009) found a strong correlation between the three COI constructs and concluded that the theory did not consider students' self-efficacy of learning online. Shea and Bidegerano (2009) found that teaching presence and social presence were significantly correlated with student self-efficacy, which was a part of self-regulation and included students' efforts and beliefs in the notion that they could achieve significant knowledge when learning online.

Lam (2015) expanded on Shea and Bidgerano's (2009) research and introduced the concept of autonomy presence. "Autonomy presence is the drive to inquiry that leads to sharing and discussion initiated by individuals" (Lam, 2015, p. 52). There were four elements of autonomy presence. The first element was intrinsic motivation and included the notion that students search for online activities not instructed by the teacher. The second element, interpretation, was the construction of ideas contributed by individuals. The final element, inspiration, was the sharing of ideas when engaged in discourse without an instructor. Kilis and Yildirim (2018) also expand on Shea and Bidgerano's (2009) study and proposed that online learning included a regulatory presence. Kilis and Yildirim (2018) studied self-regulation, motivation, metacognition, and their relationship to COI and found that self-regulation moderated the COI constructs, leading to the proposition regulatory presence). "Regulatory presence can be addressed as the

composition of forethought, performance or volitional control and self-reflection, specifically inclusion of cyclical phases of self-regulation” (Kilis & Yildirim, 2018, p. 62).

Although there are different perspectives and proposals extending COI framework, there was an agreement among scholars that online instructors were the catalyst for initiating a COI in their online courses.

Online Instructor Roles

Online instructors hold three roles: technologist, course designer, and teacher. Teaching online requires instructors to be content experts, knowledgeable with online teaching practices, online course design principles, and instructional technologies used to foster a COI (Almulla, 2022; Richardson & Lowenthal, 2017).

Role of Online Technologist

Teaching online requires instructors to be knowledgeable with course delivery and online instructional technologies (Almulla, 2022). Online learning environments should include an online instructor who modifies curriculum and assesses teaching techniques each year to determine which current digital resources may be more appropriate to meet the needs of their students (Weinkle et al., 2020). There are many technology tools and resources that online instructors can include in their online course designs which could bridge the distance gap between student, instructor, and course resources (Holbeck & Hartman, 2018). However, many postsecondary institutions require instructors and students to utilize an LMS. The LMS is a central hub for accessing online course materials (e.g., lectures, assignments, resources), submit assignments, receive feedback, and access grades (Baggs & Chan, 2010; Dintoe, 2018; Harrison et al., 2017;

Peterson & Caverly, 2005; Sattler, 2005). There are many technology tools included within an LMS program, as well as external tools that are used to provide course content, resources and create interactive learning environments (Stuart et al., 2022). The LMS and instructional technology tools that online instructors use are dependent on the instructor's past experiences, feelings, and beliefs on the effectiveness of the technology in their online courses (Coker, 2018; Dintoe, 2018; Graham, 2019).

Even though there is a plethora of technology tools to choose from when communicating and engaging students in the online learning process, instructors used the technology that they were most familiar or comfortable using (Coker, 2018; Mirke et al., 2019; Wladis et al., 2014) however, this often-included methods used in while conducting in-person instruction. For example, Dintoe (2018) conducted a case study and interviewed nine instructors from one university who taught adult education and faculty education online. The study focused on types of technologies instructors were using in their institution for online teaching and learning. The findings of the study indicated that instructors used different technologies to teach their online courses and their choices were based on their past experiences, which also included asking about the comfortable level of using technology. All instructors ($n = 9$) used technology they felt most comfortable using, which included email as the most used method to communicate information to students. Five instructors used Blackboard (LMS) and land line telephones, four used cell phones, and three used WebCT (Blackboard LMS tool) to communicate with students. A few online instructors used social media (e.g., Twitter and Facebook), YouTube, and Smartboards. Also, instructors preferred written dictation over PowerPoint, and worksheets/handouts over interactive online programs (Dintoe, 2018). Research indicated

that many instructors were more comfortable using emails and phone calls, over any other method (Broadbent & Lodge, 2021; Graham, 2019; Harrison et al., 2017).

However, the most comfortable method may not be the most effective in getting students to engage in the learning environment(s), especially when students have different perspectives of using the technology (Darius et al., 2021). When Darius et al. (2021) surveyed 450 students from engineering and medical colleges in South India, they found that students preferred animation, PowerPoint video lectures, multiple choice online quizzes, and student versions of software, where instructors preferred email, phone calls, and online discussions. The instructor's choice of technology when engaging students in the learning process was different than the student's choice. An instructor's choice to engage with students may influence student learning (Hurt et al., 2012).

Students may be more academically productive if instructors used methods that students found beneficial in helping them learn the content (Hurt et al., 2012). For example, Hurt et al. (2012) surveyed students ($n = 62$) in two entry level courses (i.e., Introduction to Philosophy and Introduction to Women's Studies) on students' levels of comfort when engaged in course discussions using social media (i.e., Facebook) and LMS forums. The pretest revealed that students in both groups felt more comfortable with instructor-led forums compared to student-led forums. Students felt that discussions increased their confidence as a writer (21.5%) and some agreed that they liked class discussions (21.9%). Content analysis conducted on the open-ended question revealed that most students liked discussions ($n = 76$), however they liked them for varied reasons. Some students liked the immediate feedback, others thought discussion allowed them to think about complex concepts before discussing it with others. However, some students

felt online discussions were disjointed and stated that they preferred in-person conversations over online discussions. The post-test results showed that students in the Women's Studies course were more comfortable at the end of the course with student-led and instructor-led discussions using Facebook or forums, than the students in the Philosophy course. The pretest also revealed that students were using Facebook more than the LMS forums. Many students posted more on Facebook than on the LMS forums, however, students commented that it was confusing to use both discussion mediums, resulting in some forgetting to post on the LMS forums. Also, some students felt Facebook could distract them from participating in academic discussion and thought that LMS forums were formal and should be used in the academic setting over social media. Students were accustomed to thinking about Facebook as a social networking tool, used for sharing personal information with friends, and not a platform for discussing academic and course issues. However, some students thought Facebook to be a useful tool for sharing information and made them feel supported in their learning environment (Hurt et al., 2012). This study was conducted many years ago and there have been many advancements in technology where social media and programs have been added to LMS platforms. Students may be more accustomed to using these modern technologies in educational settings (Broadbent & Lodge, 2012). For example, Zoom and the LMS have chat features, which allow instructors and students to communicate and engage in chats or text type of discussions. Live Chat, an LMS feature, allows for personal one-on-one communications between instructor and students, much like texting on a mobile phone (Broadbent & Lodge, 2012). Two-hundred and forty-six students in hybrid and online courses were surveyed to uncover how students felt about using Live Chat. The study

focused on identifying student satisfaction of the program and support provided by the instructor. The results indicated that students in the blended courses avoided asking questions about feedback on grades, extensions on assignments, and assessments, while online students felt more comfortable asking these types of questions. About half of the students said they felt comfortable asking anything, however, a quarter of students did not like asking personal questions because they felt self-conscious about their comments. When looking at these results, the reader must wonder if the instructor provided implicit instructions for their students about the program or left students to identify the program's features on their own. Many students may not know how to use or understand program features and may need instructions or extra guidance when using the program. Some students were not sure what types of questions they should ask in Live Chat or what questions they should ask in the forums (Broadbent & Lodge, 2012). Research indicates that students may feel differently and have better outcomes when engaging in asynchronous forum discussions over in-person (synchronous) or chat type (semi-synchronous) discussions (Ajabshir, 2019; Brierton et al., 2016). Forum discussions allow time for processing, reflection, reviewing, and editing before posting or replying and showed higher cognitive behavior levels among graduate students who engaged in forums compared to semi-synchronous chat discussion (Brierton et al., 2016) and in-person discussions (Ajabshir, 2019).

However, online students commented that they liked the immediate feedback of Live Chat compared to the forums (Broadbent & Lodge, 2012). Students also felt the program was easy to use and the instructors were supportive in the chats. Research supported that instructors may benefit from knowing how students feel about the

technologies they are asked to use in their courses (Graham, 2019). However, little research can be found examining instructor perspective and beliefs of students learning with certain technologies.

When looking at research conducted on the technology preferences of developmental educators, many studies focused on developmental mathematics courses, which included the instructors' willingness to incorporate technology in their in-person courses and the students' ability to succeed using computer-based mathematic programs (e.g., MyMathLab). For example, Martirosyan et al. (2017) surveyed 890 instructors from multiple disciplines in DE on the types of technologies and their willingness to implement technology into their instruction. Instructors used Microsoft products (i.e., Word, PowerPoint, and Excel), graphing calculators, document cameras, interactive whiteboards, supplemental websites, including computer-based labs (e.g., MyWritingLab, MyMathLab, and ALEKS) Martirosyan et al. (2017) also found that more females (86.9%), full-time employees (87.6%), and instructors teaching integrated reading and writing courses (97%) were more likely to integrate technology into their courses over males (78.6%), part-time employees (81.7%), and instructors teaching other DE subjects (i.e., reading, writing, and mathematics). Instructors teaching developmental reading and writing courses preferred to focus more on content and skills and less on determining the technology to implement in their instruction. Instructors felt that their time was better spent teaching reading and writing skills instead of learning modern technologies (Martirosyan et al., 2017). Cafarella (2014) inferred that if instructors were not comfortable teaching with computers, asking them to do so could influence student success.

Even though Martirosyan et al. (2017) offered valuable information needed in the DE field, they only looked at in-person courses. Online instructors may use different technologies in their courses or feel differently about the effectiveness of certain technologies. Online instructors were less likely to use technology when they felt they were constantly struggling to keep up with the usual teaching tasks (e.g., providing feedback, grading, submitting grades, contacting students, and solving technological issues) and felt they were continuously learning or relearning emerging technologies (Churcher et al., 2014). Even though there are many diverse types of instructional technologies available, many online developmental educators did not welcome the idea of implementing the use of technology in their in-person courses (Cafarella, 2014; Harrison et al., 2017).

Some instructors have little choice on the types of technologies they get to implement or incorporate into their course designs. For example, Cafarella (2014) interviewed six instructors who taught developmental mathematics at three different community colleges to capture their perspectives of transferring their course instruction from in-person to online self-paced accelerated and compressed courses. Administrators of the universities in the study required that all developmental mathematics courses be taught online using a computer-based program, with little regard for the instructors' feedback on the effectiveness of the programs. Instructors expressed that some students did not like learning in computer-based environments and felt that they would be more successful with in-person courses, especially students with limited access to computers, limited experience learning with computers, or students who may need more support when learning basic mathematics skills (Cafarella, 2014). Instructors teaching

developmental mathematics believed that implementing technology (i.e., computer-based programs) may be good for some students, but may create anxiety among other students (Cafarella, 2014).

Instructors may also choose not to use technologies if they lack the skills and or training needed to effectively use the technologies, or if they feel the technology is ineffective in their classrooms (Martirosyan et al., 2017). Instructors not trained in some technologies are less likely to know how to help students access them (Graham, 2019). Those who are trained could help establish a sense of community among course participants and help students feel less isolated (Richardson & Lowenthal, 2017). Samuel and Conceição (2022) suggested that three factors (i.e., course design, unclear expectations, and the lack of peer interaction) contributed towards the feeling of isolation in online learning. When students and instructors engaged in discussions the distance gap and the feeling of isolation reduced (Samuel & Conceição, 2022). Peterson and Caverly (2005), who published a paper advising on COI in online developmental literacy instruction, questioned the implementation of technologies in DE classrooms. They suggested that instructors may not understand or realize the importance of technology in online DE courses or the impact it can have on student learning. Developmental educators should understand the nuances needed to adapt technologies used in their online courses, which can help students gain access to technology and shrink the distance gap. Research indicated that technology or the lack of technology may impact student learning, especially when instructors and/or students lack access to adequate technology needed to conduct and attend online DE courses (Martirosyan et al., 2017).

Technology, when accessible, can complement teaching practices and help instructors build online instruction that supports student learning and helps students feel more connected and less isolated when learning online (Peterson & Caverly, 2005). Instructors need to be knowledgeable about effective technologies used in online course designs so they can better support student learning. Some instructors may have control of their online course designs, while others may have little to no control, which can limit and hinder the ability to create interactive online courses (Baldwin et al., 2018; Richardson et al., 2015).

Role of Online Course Designer

Designing effective online courses requires instructors to have pertinent knowledge of instructional design principles, to be fluent in the knowledge of an LMS, and to have technology tools accessible to them for designing supported learning environments. However, many instructors who designed their online courses were not aware of instructional design principles (Baldwin et al., 2018). When surveying fourteen instructors on course design practices, Baldwin et al. (2018) found that instructors were either unfamiliar or unaware of formal instructional design practices and principles used in online course design. A favored design principle such as ADDIE (Analysis, Design, Development, Implementation, and Evaluation) has been used to guide online course design (Baldwin et al., 2018). Many instructors relied on their knowledge and past experiences of teaching in-person courses when designing online instruction, however, online teaching and learning is different from in-person teaching and learning (Baldwin et al., 2018). This was made apparent in a study conducted using full-time and adjunct faculty members engaged in online or in-person course development, design, and

teaching practices conducted at a four-year historically Black university in Virginia (Graham, 2019). The results showed that online methods could also be used for in-person courses; however, some in-person methods did not work in online courses. Instructors specified that teaching online assisted them in thinking differently about teaching, which prompted them to change their online course designs (Graham, 2019). Most instructors improved their ability to interact and respond to student questions (Graham, 2019). Some instructors mentioned that teaching online had increased their awareness of students' needs and made them realize that they needed to take different approaches to support their students. Instructors also looked at online course design differently (Graham, 2019). Scholars suggested that a well-designed online course, which includes asynchronous and/or synchronous learning activities can help instructors identify students that may struggle with self-regulation (e.g., time management skills, motivation, and help-seeking) and help uncover emotions (e.g., fears and anxieties) that students may have about content, technology, and online learning (Cho & Heron, 2015; Garrison et al., 1999; Garrison et al., 2010; Zavarella & Ignash, 2009).

Course design can also be affected by the beliefs of the instructors' abilities to use technology. Even though the LMS offers a multitude of tools, the LMS itself may hinder the instructor's ability to design effective interactive online courses. For example, instructors who taught online courses for years and were knowledgeable in using technology but not versed in instructional design practices were challenged in creating interactive learning environments (Baldwin et al., 2018). Baldwin et al. (2018) reported that the LMS was limited, time consuming, and represented a hurdle in the course design process. Knowing instructional design practices can help instructors enhance students'

positive emotional responses to the educational environment and build instruction that is interactive, engaging, and informative (Brooks & Young, 2015; Holbeck & Hartman, 2018; Lewis et al., 2015). Obstacles in online learning are caused by '*transactional distance*' between the learner and the instructor (Holbeck & Hartman, 2018, p.1).

Transactional distance occurs when students feel they are learning alone when separated from classmates and instructors in distance learning environments (Holbeck & Hartman, 2018). Students may feel like they are learning alone unless an instructor created different strategies to connect learners with others (Holbeck & Hartman, 2018) and may not access course materials on their own (Stadler & O'Reilly, 2021). Stadler and O'Reilly, (2021) when measuring the number of times students accessed online course resources and comparing that to the number of assignments completed and grades, found that many students would access and complete assignments without even reading the assignment resources. When students accessed resources, they only did so because there was a grade attached to the assignment (Stadler & O'Reilly, 2021).

Role of Online Teacher

Even though there were not a lot of studies that focused on online teaching and learning from the instructors' point of view, there were a few. Studies examined instructors' perceptions of teaching online, and included strategies to support, engage, and provide feedback to students. Strategies included requiring students to work in groups, establishing classroom protocols, and intervening in student discussions. Some strategies were more effective than others in influencing student engagement with online instruction and participating in discussions. In this section, I discuss instructor protocols, communicating with others, and instructor feedback.

Online Classroom Protocols During COVID-19

Online classroom protocols are teaching practices that instructors use to create structure in their online learning environments. Some protocols worked better than others. An instructor's readiness and experiences can vary across spectrums, and the more experience a teacher has does not necessarily mean they have higher levels of readiness (Scherer et al., 2023; Spinks et al., 2021). For example, instructors who transferred from in-person instruction to online instruction due to COVID-19 noticed an increase in their student's anxiety levels of learning online (Tabvuma et al., 2021), feeling of helplessness, loss, and grief (Spinks et al. 2021) and decrease in motivation, attention, and academic performance (Armstrong et al., 2022).

The basic communication methods for Zoom included a microphone for sound and a camera for visually seeing course participants, however, instructors have access to many more features (e.g., screen share, chat box, emojis, polling, and many others) to choose from when engaging students in synchronous learning (Greenhow et al., 2022; Pregowska et al., 2021). Ezra et al. (2021) who also studied synchronous online teaching practices of engaging students found that when online instructors used too many methods in their teaching sessions, not only was it a challenge to monitor all discussions, but it promoted confusion and anxiety among students. For example, when the online instructors encouraged students to contribute towards class synchronous discussions (e.g., using the microphone and camera) and allowed students to also contribute to the conversation using the chat feature of Zoom (i.e., asynchronously), it created anxiety and confusion among students. Many students felt frustrated because the instructors could not keep up with both conversations (Ezra et al., 2021). Spinks et al. (2021) studied the

effects of COVID-19 and the mental effects of transferring from in-person to online instruction on students and instructors and found that the transfer had a profound impact on the mental psyche of students and instructors because of health issues and because the distance and disconnect from transferring to an environment that was unfamiliar to them. Instructors who were not aware or able to provide structure that connected them with their students showed a larger disconnect between instructor and students (Spinks et al., 2021).

Many instructors during the transfer to online instruction during COVID-19 were advised to use the same teaching practices as they did when instructing students in-person (Bannink & Dam, 2021). Postsecondary students ($n = 25$) enrolled in their second- and third- year at a university in The Netherlands were studied for reactions to the instructor's teaching protocols within synchronous courses. Courses were originally conducted in-person and moved to synchronous courses (i.e., Zoom) due to COVID-19. The study focused on student responses to turn-taking procedures, socialization, peer support, and instructor feedback methods while observing methods of conversational roles (i.e., joking and humor). The instructors in Bannink and Dam's (2021) study were advised to use the same teaching protocols for teaching online instruction as they would their in-person instruction. In-person protocols included instructors requiring students to raise their hand before asking a question, this teaching practice was unsuccessful as an online practice. Conversational cues (e.g., gaze direction and tracing the origin of sound and or speech), which were successful in most in-person conversations, were a challenge in online synchronous classrooms (Bannink & Dam, 2021). Instructors who relied on facial and hearing cues promoted confusion, frustration, and anxiety among some students (Bannink

& Dam, 2021). Many instructors experienced the limitations of Zoom when they were unable to see all 25 course participants on a screen at one time nor could they easily determine who had their hand raised and for how long. Many students were overlooked and were not called upon by the instructor, especially when the instructor was not following their own rules; calling on students who had their hand raised. Many students spoke out of turn and the instructor did not correct those behaviors, which resulted in students being overlooked leading to students eventually giving up, tuning-out, and dropping-out of the online class discussions. This study did not look at courses taught online before COVID-19 or asynchronous protocols; it is unsure if these same challenges would be present with instructors who were familiar with online learning protocols. Instructors with more experience may have used different protocols or methods for engaging students.

Although instructors had the best intentions of including all students in discussions, offering multiple ways to engage during a single class session could influence student behaviors. It is important that instructors be taught appropriate online teaching practices, familiarize themselves with the technologies that they are to use in their online courses, be mindful of their students, and honor their own protocols.

Effects of Engaging in Discussions

Instructors who used discussions in their online instructions found that some students may feel uncomfortable when asked to engage in discussions (Ritzhaupt et al., 2022), while others found that students shared similar experiences, viewpoints, and feelings about learning (Hurt et al., 2012).

Ritzhaupt et al. (2022) studied student emotions when learning online by surveying 297 undergraduate students enrolled in online courses in education, computer science, business administration, and mathematics from four different public universities. The survey included statements asking students about their individual experiences when working in groups and communicating with others. Examples of statements included, “lack of student-instructor communication in an online course is stressful for me,” “I worry if I can communicate effectively with other learners in an online course,” and “online courses scare me” (Ritzhaupt et al., 2022, p. 117). A factor analysis uncovered constructs which identified students’ feelings about engagement. Constructs included feelings of negativity and inadequacy ($\alpha = .94$), apprehensions towards personal communication ($\alpha = .90$), and discomfort with instructor presence and communication ($\alpha = .89$).

These results seem to show that instructors had a negative influence on students' learning potential, emotions, and anxiety levels. However, the researchers did ask students to answer statements that were focused on negative emotions or on the lack of something, they failed to include statements that might solicit positive emotions responses. Hurt et al. (2012) looked at the mindset of 107 students on their engagement within online conversations and found when students engaged in conversations, they would share stories and experiences, many discovered that they shared similar feelings about learning certain subjects, which led to a positive change in their mindset over time. Instructors have a vital role in providing learning opportunities that support students and encourage student learning, which can influence students' confidence in their abilities and help them feel more at ease when learning online (Hurt et al., 2012). These results were

supported by another study where researchers looked at the positive influence that instructors had on student learning. Two hundred and sixty-seven undergraduate students enrolled in online courses at a large university from various disciplines were studied to see how different aspects of the course instruction influenced student learning (Ezra et al., 2021). Results indicated that instructors positively affected students learning in course design (.68), direct instruction (.67), facilitation of discussions (.70), and when giving immediate verbal feedback (.53) to their students (Ezra et al., 2021). However, students in that study were graduate students and the same results may not be gained when using undergraduate students (Ritzhaupt et al., 2022).

An instructor's choice to engage in student discussions and their methods of engaging were also studied. Videotapes of two instructors, with over two years of experience teaching online, who instructed postgraduate students in two different courses were analyzed for themes identifying actions of instructors' during discussions (Van Braak et al., 2022). The focus of the study was to determine how and when instructors intervened in student discussions. The researchers analyzed verbal and non-verbal cues, and codes emerged (e.g., correct, explain, corroborate, and elaboration) that identified instructors' actions towards students when engaging in discussions. The timing of the action and how actions were carried out (e.g., corroborating a conclusion, illustrating with a personal experience, and the effects of the actions) were also examined. Their findings indicated that teachers conducted moderating, expert, and evaluating types of actions when they noticed that students misunderstood concepts, when conversations were not relevant, when discussions lacked different perspectives, or when students needed help in solving the discussed issues. The instructors in Van Braak et al. (2022)

had at least two years of online teaching experience, and students were enrolled in a health program and in their first-, second-, and third- year of residency. The readers were left to question if instructors and students with less online teaching and learning experience could recognize when to intervene or if students needed intervention.

Subject Specific Online Developmental Education Instruction

Research that investigated online teaching and learning with DE instruction focused on students enrolled in online mathematics courses, more than DE reading, and writing instruction. In this section, I first discuss developmental reading and writing instruction but also draw on other research for support. Next, I discuss online developmental mathematics instruction.

Discussions in Reading and Writing Instruction. Most students struggled due to the amount of reading and writing involved in learning asynchronously and instructors were challenged to find successful methods to engage students (Stine, 2010). Stine (2010) shared firsthand experience of instructing students enrolled in hybrid developmental reading and writing courses, suggesting that the challenge of learning online may be even more compounded for students enrolled in DE (Stine, 2010). Online learning can foster ‘bad habits’ of reading (e.g., read selectively, missed main points, and missed underlying meanings) and writing due to the differences between writing conventions (e.g., email, text, chats, and online discussions) that do not follow conventional academic writing styles (Stine, 2010, p. 54). However, Stine’s (2010) study only includes one view of teaching and learning with hybrid developmental reading and writing instruction, however, fully online instruction might have different views on teaching developmental reading and writing instruction online in other delivery formats.

Students may not be prepared for online reading instruction and instructors may need to intervene when requiring students to prepare for classroom discussions (Oliver, 2022). Oliver (2022), who did not study DE but sought to identify the pedagogical approaches for improving reading compliance and meaningful discussions by coding student journal entries and survey questions. The focus of the study was to determine the motivation for reading compliance, which included the establishment of professional learning community (i.e., book study groups), preparing for comprehension, and reading assignments (e.g., journal assignment) followed by in-class discussions (Oliver, 2022). The results revealed that all students found discussions helpful in understanding the connections between the text they had to read and their future teaching practices. Themes from the qualitative analysis indicated that students were more engaged in small group discussions and the small group discussions were beneficial in helping students make connections to their future profession. However, all students in Oliver's (2022) study did their readings before class and were motivated and prepared for the discussions, one must wonder how an instructor could help students who were not fully prepared for discussions, especially when instructors were challenged to get students to read at a postsecondary level (Stine, 2010).

Discussions in Online Mathematics Instruction. Typically, mathematics instructors do not conduct discussions in their mathematics courses, so requiring students to engage in discussions is not a normal teaching practice for online mathematics teachers (Sattler, 2005). However, a few online mathematics instructors who taught developmental mathematics were found to use discussions in their courses. Sattler (2005) conducted an inventory-style survey to collect information from members of AMATYC

(American Mathematical Association of Two-Year Colleges) who taught online developmental mathematics instruction. Results of the study revealed that many developmental mathematics courses were delivered asynchronously, and an instructor's choice of teaching practices could be dependent on their experience with teaching developmental mathematics and influenced by ethnicity, gender, and age. The instructors who responded to the survey included more female instructors ($n = 67$) than male ($n = 30$) instructors; most instructors were over the age of forty; and had on average 14 years of teaching developmental mathematics, with an average course size of 24 students. Most of the courses were delivered asynchronously (58%), with a small percentage delivered synchronously (11%), and through hybrid (31%) methods. Sattler (2005) found instructors who used collaboration practices (i.e., in-person discussions and online discussions) differed in their collaboration methods. Most instructors preferred in-person orientation and tutoring sessions when giving immediate feedback and assisting students with questions, but differed in group discussions, student projects, and study sessions. The results revealed that more instructors preferred online group discussions ($n = 62$) over in-person group discussions ($n = 32$), online student projects ($n = 26$) over in-person student projects ($n = 19$), and in-person study sessions ($n = 29$) over online study sessions ($n = 35$). Most instructors who used threaded discussions ($n = 64$) were moderately to highly successful in getting students to engage in their online developmental mathematics discussions, whereas a few instructors perceived threaded discussions were less successful or unsuccessful ($n = 11$) when getting students to engage. A sizable percentage of the developmental mathematics instructors did not use threaded discussions in their online courses ($n = 38$). Only two online developmental mathematics instructors thought

videoconferencing was highly or moderately successful for engaging students (Sattler, 2005). Most of the instructors ($n = 100$) indicated that they did not use videoconferencing programs. Most of the courses in Sattler's (2005) study were taught asynchronously, however a few (11%) were taught with videoconferencing, however technology has changed over the past 18 years, there may be more synchronous courses offered in postsecondary education today. It was also unclear if the instructors in Sattler's (2005) study engaged in discussions with their students. Instructors should not only be observing student conversations but engaging in the conversations with students and not doing so could influence student learning (Brooks & Young, 2015).

Also, the use of programs to teach content (e.g., MyMathLab) may change the role of the instructor. For example, Cafarella (2014) who explored the practices (i.e., methods, techniques, and strategies) of 20 developmental mathematics instructors teaching in-person courses at an urban community college that used MyMathLab in their in-person courses, found that one instructor felt she was watching the students learn and was a bystander in the learning process – feeling no real purpose or connection with students or the learning environment. Research also indicated that instructors may have the best intentions of engaging students, but when they do not require students to engage in the activity, many students may forgo engaging in the activity, and this action could have an impact on students' retention in the course. Trenholm (2009) compared students enrolled in three different developmental mathematics learning environments (i.e., online, in-person, and in-person computer lab). All courses had the same web-based materials which included mini lectures provided by the instructors, supplementary on-demand web-streamed video lectures, e-textbook, and the computer-based help feature from

MyMathLab, as well as additional web resources provided by individual instructors. The online courses were taught in an independent study format, used MyMathLab, and included weekly updates provided by the instructor. Although the instructors did not require student-to-student interactions, they did encourage it by asking students to reach out to their peers or come to office hours if they had questions or needed help. Most students chose not to ask peers or use the instructor's office hours, nor did they ask for help. Trenholm (2009) suggested that students who struggled with self-regulation skills (e.g., time management and help seeking) and mathematics skills, should not take a course that minimizes instructor control and involvement. However, Potocka (2010) found that students enrolled in an online developmental mathematics course, which had no instructor or presence of other students, were more successful in passing mathematics (i.e., made higher grades on the final exam) than students enrolled in in-person courses that had instructors and other students. Potocka (2010) compared one online developmental mathematics course that had no instructor (self-paced module designed courses) with three in-person courses where there was an instructor for each course and other students' presence. Potocka (2010) wanted to identify student performance, attitudes, and perceptions of learning online compared to learning in-person. The students who enrolled in the online mathematics course self-selected to be in the online course, which was self-paced and taught by a computer-based lab program (i.e., MyMathyLab) with proctor exams offered at a testing center. In-person courses were taught traditionally by an instructor where students utilized MyMathLab as a supplemental program, which was only used for practicing homework. Students in the online course had access to a tutoring center if they needed help but relied on the MyMathLab program for instruction,

homework, and feedback; no instructor was hired to teach, help, or proctor students in the online course. Potocka (2010) reported that the students in the online course outperformed the students in two of the three in-person courses. However, more students withdrew ($n = 5$) and had more incompletes ($n = 5$) compared to the in-person courses combined. When examining the responses from students who enrolled in the online course section, students reported that they realized that learning online required strong time management skills and it was “easy to slack off” and fall behind (Potocka, 2010, p. 514). A few students relayed the importance of passing developmental mathematics to further their education and felt they had to learn how to teach themselves a subject in which they had little knowledge base, and or experience with, making learning mathematics more challenging for them. Spradlin and Ackerman (2010), when talking about DE online courses, stated “[t]he mere presence of computers does not improve student learning” (p. 14). Sattler (2005) suggested that instructors may need to consider offering individualized instructions, provide orientations for students, research resources available to support student learning in the online courses, provide timely feedback, and learn instructional design practices to teach online courses. One such example was the study conducted by Martirosyan et al. (2017) who surveyed 890 developmental mathematics teachers and compared instructor’s gender, employment status (full or part time), and what courses they were teaching. They found that more females (86.9%), full-time employees (87.6%), and integrated reading and writing instructors (97%) were more likely to incorporate technology into their in-person instruction. Males (78.6%), part-time employees (81.7%), and instructors teaching non-integrated DE subjects (i.e., reading, writing, and mathematics) were less likely to incorporate technology into their in-person

instruction. Examples of technology, which instructors used in their in-person courses included Microsoft products (i.e., Word, PowerPoint, and Excel), graphing calculators, document cameras, interactive whiteboards, supplemental websites, including computer-based labs (e.g., MyWritingLab, MyMathLab, and ALEKS).

Providing Feedback

Feedback was used to help students learn and provide students with information that could be used to enhance their learning; however, research showed conflicting results when trying to understand how instructors provided feedback to their students and how students perceived that feedback.

For example, the lack of feedback can influence student learning. Almajali et al. (2022) who interviewed 34 students from 18 private universities to measure student perspectives of feedback from their instructors. Open coding revealed that students felt their instructor was not giving them enough feedback or the feedback was delayed. Students remarked that their “instructor does not provide immediate feedback”, “you must receive regular feedback on examinations, discussion postings ...”, “... did not return phone calls or emails. I had no way of getting ahold of her”, “we are not getting enough feedback”, and “I feel that the design needs to be altered manually, and we have to find help and information from other sources” (Almajali et al., 2022, p. 9). The reader was left contemplating reasons why all students in the study felt they were not receiving adequate feedback from their instructors. The study did not disclose results that showed that some students felt they received adequate feedback, were satisfied with it, or read the feedback given. Research has shown not all students feel the same about instructor

feedback, some students feel that instructors do provide supportive and timely feedback (Thomas et al., 2017).

Students may have different views on instructor feedback that could influence student learning. Also, the method in which feedback is given could influence student learning. For example, Thomas et al. (2017) conducted research using 167 students (all education majors) who enrolled in eight different sessions of a one-credit hour technology integration course, which were taught by six different instructors. Overall, 84% of the students were happy or extremely happy with the overall satisfaction of the instructor's feedback. Eighty-six percent of the participants thought the grade was most useful as feedback. Many students (92.3%) agreed or totally agreed that they understood the assessment criteria provided for each assignment. Students were also satisfied with the amount of feedback received (92%), and 56% did not care about positive feedback but wanted to know how to improve their assignments. When researchers asked the students if they read the comments provided by the instructor, most did (93%) but some students did not (58.5%). The results from the study revealed that 95.4% of the students felt that their work had improved during the semester due to the feedback that they were given from their instructor (Thomas et al., 2017).

The purpose of Thomas et al.'s (2017) study was to understand student perceptions about instructor-provided feedback (e.g., types of feedback, usefulness of feedback and satisfaction with feedback). A questionnaire was administered to students enrolled in fully online courses, which had at least one meeting with the instructor at the beginning of the semester. All students had the option to come in-person, if desired. All students received online feedback from their instructor on three major assignments,

which were similar across courses. Two instructors provided students with text for the first two assignments, and then asynchronous video feedback for the third assignment, while five instructors provided video feedback on the first two assignments, and text feedback on the third assignment. One instructor was omitted from the study due to not providing text feedback on the first assignment and failed to provide regular feedback on all the major assignments. The students studied in Thomas et al. (2017) received feedback from their instructor, and students thought the feedback was important, helpful, or adequate. However, not all students had the same perspective about instructor feedback. Some instructors may not provide their students with helpful, adequate, or regular feedback (Almajali et al., 2022). Also, the study design only included asynchronous feedback and, since many courses moved to online synchronous courses due to COVID-19, instructor feedback may be delivered and perceived differently, especially if the instructor was new to online teaching.

An instructor's choice of teaching practices and strategies of teaching online could be the most important asset that a student has in being successful when learning online (Ritzhaupt et al., 2022). Instructors should incorporate activities that support student learning, which can be used to identify challenges that students may struggle with when learning online (Richardson et al., 2015). However, many instructors may not be aware of online practices, especially when instructors may have had limited past exposure to online instruction, teaching methods, and course design (Baldwin et al., 2018; Ritzhaupt et al., 2022).

Gaps in Literature

In this section, I discuss three major gaps found in literature. The gaps included instructor perspectives of effective online teaching and learning practices, student population, and measuring instructor perceptions of teaching presence, social presence, and cognitive presence in their online courses.

First, instructor perspectives on student learning are missing from the literature. Research included in this review focused on the perspectives of students. Students were examined on how they perceived their online learning environment(s) (Potocka, 2010; Ritzhaupt et al., 2022; Trenholm, 2009). Many of the studies included students enrolled in postsecondary programs that may or may not have included information about the instructors who taught in those programs. The few studies that did include instructors focused on teaching methods (e.g., assignments, feedback, and technologies) and the students' perceptions of engaging in those methods. Also, the students in the studies were mostly recruited from graduate programs in the health, technology, or education fields. Very few studies included undergraduate students, or students enrolled in online DE courses. The studies that did include students enrolled in DE courses examined students enrolled in in-person, hybrid, asynchronous, self-paced modular, and mathematics courses. Research was not found that included instructor perspectives of teaching DE courses that were offered fully online (i.e., synchronously, or asynchronously), or emergency remote courses. It was unclear how effective teaching methods were for students enrolled in online courses, especially courses that served undergraduate students, students who were new to online learning, students who were new to college learning, or students enrolled in DE courses. Graduate students in those research studies were familiar

with college learning and online learning; however, undergraduate students, students new to online learning or college, and students enrolled in DE courses may need extra support when learning online.

Second, many studies focused on student perspectives of the effectiveness of online teaching and learning that included technology (e.g., LMS, LMS tools, telecommunication programs, social media, MyMathLab), methods of communication (e.g., emails, text, phone, forums, asynchronous video lectures), and assignments (e.g., discussions and group projects). Research was not found that included the perspectives of the instructor on the effectiveness of online teaching and learning in various online environments (e.g., fully online, emergency remote, asynchronous, and synchronous), especially in DE. The research lacked a clear picture of the teacher's role or practices used to support undergraduate students, students new to online learning, or students enrolled in DE online courses in different learning environments. Many studies were designed to compare in-person and online teaching practices and student learning. Studies that were designed to compare different online environments were lacking in literature, especially those focused on educators' perspectives.

Finally, many studies measured course satisfaction using the Community of Instrument questionnaire designed by Arbaugh et al. (2008) to measure students' perceptions of teaching presence (e.g., how well students felt their teacher provided them with course structure, facilitated discussions, and gave feedback (i.e., teaching presence), social presence (e.g., how comfortable students felt when engaged in learning activities with other students, and ability to form impressions of other students), and cognitive presence (e.g., how well students thought the course supported them in knowledge

transfer). Other studies that used COI constructs as a guide to measure the perspectives of online instructors on teaching, social, and cognitive presence in their online instruction, focused on qualitative coding methods for analyzing discussions between students and instructors (Offenholley, 2012). Quantitative instruments in research that were used to measure instructors' perspectives of COI constructs were very limited. One study conducted by Gurley (2018) appended an instrument created by Arbaugh et al. (2008) who measured students' perspectives of online learning satisfaction with teaching, social and cognitive presence, however, Gurley (2018) only examined teaching presence (i.e., course structure, facilitation of student learning, and direct instruction and feedback). And furthermore, Gurley (2018) only reported on two of the teaching presence constructs (i.e., course structure and facilitation of learning activities). No other research could be found that used quantitative methods to measure the instructors' perspectives of COI constructs. Research mainly included qualitative studies where researchers used codes that defined themes found in student-to-student and some instructor-student asynchronous discussions. A quantitative instrument could help instructors identify areas of strengths and weaknesses just-in-time so they could better help current students, where qualitative methods may not be as time efficient.

Chapter Summary

This chapter introduced social constructivism as the foundational framework and COI as the conceptual framework. The premise behind social constructivism is that knowledge is socially constructed. The COI theory was used as the conceptual framework and served as a guide for the literature review, research design, and serves as a guide for analysis. The COI theory includes three interrelated concepts (i.e., teaching,

social, cognitive presences) that, when present in the online learning environment, can influence course participant satisfaction. The COI theory has also been used to help design online courses. Each component in the community inquiry contains elements that help guide instructors, course designers, and researchers in understanding the innerworkings of interactive online courses, which can help in course design and development.

The chapter also provided an in-depth look into literature in the field of education, which offered information about online technologies, teaching practices, and the effects of the online teaching practices used to support student learning in different online learning environments. An instructor's choice of technology and teaching practices are based on their past experiences, their perceptions of effectiveness, and what they are most comfortable using. For example, many teachers used asynchronous discussions to create a COI, used emailing and phone calls to communicate with students, and provided feedback through asynchronous assignments.

Finally, the gaps found in the literature were discussed. The most prominent information missing from the literature were studies conducted on online learning environments, which included instructor perspectives of online teaching and learning, especially in courses that served undergraduate students and students enrolled in DE courses. Much of the research included studies conducted on graduate programs in technology and health fields. Research which reported on DE was limited to asynchronous mathematic course, or courses without an instructor.

III. METHODOLOGY

Chapter three includes a detailed description of the research design, materials, and analyses methods used to answer the research questions for this study. The research design included processes and procedures designed to explore educators' roles in postsecondary DE online courses, who taught in various online learning environments. Educators' perspectives of online teaching and learning were also explored.

The information from this study can benefit the DE communities, faculty, and students. The insights gained from this study can inform on effective practices used in various online setting that were perceived to support student learning.

First, this chapter starts with a description of the research design, which includes a restatement of the research questions. Secondly, information about the studies participants, recruitment methods, and inclusion criteria are discussed. Thirdly, details on the study's methods, materials of measurement, data collection procedure, and analyses procedures are provided. This chapter concludes with a discussion on the study's limitations, followed by a summary of the chapter.

Research Design

This exploratory study was designed to explore the perspectives of educators who taught students enrolled in DE courses in online postsecondary learning environments. Little information is known about online DE learning environments, teacher perspectives of online teaching and learning, or instructional practices and communication methods used to support students in reaching their learning goals.

This study was a quantitative study that collected some qualitative data. This study was not a mixed methods study. A mixed methods study uses quantitative data and

qualitative data that can be triangulated using three sources to validate the method (Zohrabi, 2013). One source comes from quantitative data and the second and third sources are qualitative and derived from open-ended questions on a questionnaire, other texts, interviews, and/or focus groups (Zohrabi, 2013).

For this study data were gathered from an online survey. Quantitative data were collected from participant responses to 34 statements using a Likert scale (1-4) and then analyzed using quantitative analyses (e.g., frequency distribution, exploratory factor analyses, and Mann-Whitney U). Qualitative data were collected from participant responses to the open-ended questions and analyzed using open coding analysis. Quantitative data were analyzed for normality, and validity using $p = .01$ significance value, while qualitative data were checked for validity using raters. The open-ended questions were coded for categorized groupings, which helped identify instructor roles, and how they perceived online teaching and learning in various online learning environments.

Five research questions and three sub-questions were designed to provide a better understanding of instructor roles and capture their perspectives of online teaching and learning. The questions are as follows.

Research Questions

There are five primary research questions and three sub-questions. The research questions are as follows.

1. How does the COI framework describe instructor perceptions of online teaching within developmental education courses?

- a. How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?
 - b. How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?
 - c. How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?
2. What are the differences in levels of engagement in student discussion by demographic group and learning environment?
 3. What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?
 4. What successes and challenges do online developmental educators encounter in their online courses?
 5. How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?

Participants

In this section, I provide a description of the participant recruitment method and inclusion criteria. This section ends with a brief description of the participants' compensation for educators who took the survey.

Participant Recruitment

For this study, the target population were practitioners who taught DE math, reading, writing, English, learning frameworks, or corequisite courses online at either a

two-year or four-year postsecondary institution. Participants for this study were recruited using emails (see Figure A1 in Appendix A) and paper flyers (see Figure A2 in Appendix A) in accordance with institutional IRB requirements (see Appendix B for approval letter). Educators were emailed a link to a Qualtrics online survey along with a letter that described the nature of the study and the time commitment required to complete the survey. Emails were broadcasted monthly on an educational listserv and sent to a list of grant partners coordinating with the Texas Higher Education Coordinating Board who report on DE in 2-year and 4-year postsecondary learning institutions in the state of Texas. Also, flyers were handed out to attendees of the College Reading and Learning Association (CRLA) professional conference for developmental educators held in October 2021 in Cincinnati, OH.

Participant Inclusion Criteria

Participants who were eligible for this study were educators who previously taught or were teaching students enrolled in online postsecondary DE courses, learning frameworks courses, or corequisite courses paired with DE courses. Educators who taught courses that were corequisite, who may or may not be responsible for teaching the DE section of instruction, were included in this study. Corequisite educators were included in this study because they assisted and supported students enrolled in the same course even though they taught different instruction (Shanahan, 2020).

Also included in this study were educators who did not teach a full semester of online instruction. For example, educators who were teaching in-person courses at the beginning of spring semester 2020 but transferred to online instruction, due to COVID-19, were also included in this study. Many educators had to transfer to emergency remote

teaching due to COVID-19 were new to online instruction and viewed online learning differently (Greenhow et al., 2020). The perspectives of online instructors who taught during the transfer to emergency remote course delivery, could help online developmental educators gain a better insight into the online learning environments and instruction used to support student learning to better prepare for future emergency transfers to online instruction.

Participant Demographic Profile

Educators had the option of providing demographic information when answering questions on the survey. Demographic questions were designed to collect educators’ ethnicity, age, gender, employment status, years teaching online, online certification status, and years teaching DE courses. Collectively they make up a demographic profile of the participants (see Table 1).

Table 1. Demographic Profile Frequency Table

Demographic Data (N = 65)	<i>n</i>	%
Ethnicity		
Caucasian/White	36	55.38
Hispanic/Latino	10	15.38
African American/Black	5	7.69
Multiracial	4	6.15
Asian	3	4.61
Pacific Islander	1	1.53
Other	1	1.53
Prefer not to say	3	4.61
Missing	3	4.61
Age		
< 30	5	7.70
30 - 49	29	44.61
50 - 59	19	29.23
60 +	10	15.38
Missing	2	3.07
Gender		

Table 1. Demographic Profile Frequency Table

Demographic Data (N = 65)	<i>n</i>	%
Female	43	66.15
Male	16	24.61
Nonbinary	1	1.53
Prefer not to say	2	3.07
Missing	3	4.61
Employment Status		
Full-time	41	63.07
Part-time	23	35.38
Missing	1	1.53
Years of Online Teaching Experience		
More than 2 years	37	56.92
1 to 2 years	24	36.92
Less than 1 year	2	3.07
Missing	2	3.07
Online Certification Status		
Quality Matters Certified	18	27.69
Institutional Certified	26	40.00
Started Certification Process	2	3.07
Learning on the Job (no certification)	15	23.07
Missing	4	6.15
Years Teaching Developmental Education / Learning Frameworks Courses		
Less than 1 year	4	6.15
1 to 2 years	3	4.61
2 – 5 years	17	26.15
6 to 10 years	11	16.92
Over 10 years	29	44.61
Missing	1	1.53

Table 1 showed there were more participants who identified as Caucasian (55%) than Hispanics (15%), African/Black Americans (8%), Multiracial (6%), Asian (3%), Pacific Islander (1%), and Other (1%). More participants were under the age of 50 (52.31%). There were more females (66%) than males (25%). More participants were

employed full-time (63%). Many participants (57%) had more than two years of online teaching experience, while a little over a third (37%) had between one- and two-years online teaching experience. More participants reported that they took professional development training for teaching online from their institutions (40%), rather than a third-party professional development certification program such as Quality Matters (28%). At least 23% of the participants did not have the chance to initiate steps towards online certification. Lastly, 45% of participants had over 10 years of experience teaching DE courses.

Participant Compensation

Participants had an opportunity to win one of four \$25 Visa e-gift cards by participating in a drawing that was held at the end of data collection. Participants could opt out of the drawing at the end of the survey. Participants who opted out ($n = 22$) of the drawing received a thank you message, ending the survey for those participants. Participants who selected to be in the drawing ($n = 43$), also received a thank you message, but were sent to another survey (separate from the data collection survey) asking for a valid email to contact them if they won one of the gift cards. Email addresses were recorded and imported into MS Excel where they were assigned a random number between 1 and 1000 with the random number generator function. The participants with the four lowest numbers were deemed the winners. An email was sent to the four winners, congratulating them, and informing them on the e-gift card redemption process. All email addresses gathered for the drawing were deleted after congratulatory emails and e-gift card redemption information was sent to winners. There were no other communications between participants and researcher.

Research Method

In this section, I provide information about the materials used to collect participant data for this study. First a description of the online survey and the questions used to solicit responses from participants. Materials, instruments, and units of measurements are discussed in this section.

Materials

This study included a 52-question survey (see Appendix C) that was designed to gather quantitative and qualitative data. Thirty-four questions were adapted from two existing instruments to create the COI questionnaire. An additional eighteen questions were created specifically for this study (i.e., Online Instructors Profile), which were designed to collect data on participants' characteristics.

This section is divided into two sections. In the first section I discuss the COI questionnaire. In the second section I discuss the Online Instructor Profile, which included eighteen questions designed for this study asking about participants demographic, teaching experience, and learning environment information.

Community of Inquiry Questionnaire

Questions from two existing instruments were adapted to collect quantitative data of the COI constructs (i.e., teaching presence, social presence, and cognitive presence) on the perspectives of online instructors, which helped answer research questions 1, 1a, 1b, 1c, 2 and 3 of this study. The COI questionnaire included thirty-four questions distributed across three scales (i.e., teaching presence, social presence, cognitive presence). The three scales originated from Arbaugh et al. (2008) and focused on student perspectives of their online learning environment and their teacher(s). Gurley (2018) adapted the

teaching presence scale from Arbaugh et al. (2008) to reflect the perspectives of online teachers instead of students. For this study, I adopted thirteen items from the teaching presence scale presented by Gurley (2018). In addition, I also adapted eight items from the social presence scale and twelve items from the cognitive presence scale from Arbaugh et al. (2008). Each scale and the scale measurement are discussed below.

COI Scale Likert Measures. Each of the three COI scales used a 4-point Likert scale to measure data for this study. A 4-point Likert scale was a commonly used tool in educational research, which forces people to make a choice on a continuum of choices that best fits their opinions, beliefs, and attitudes (DeVellis, 2003). Both Arbaugh et al. (2008) and Gurley (2018) used a 4-point Likert scale. For this study, I used the same 1 through 4 Likert scale values as Arbaugh et al. (2008) and Gurley (2018) (i.e., 1 = strongly agree; 2 = somewhat agree; 3 = somewhat disagree; and 4 = strongly disagree), however, I added an fifth scale point, “does not apply to me,” because theory indicated some online instructors may not engage in certain teaching practices (Offenholley, 2012), have control of online course design (Richardson et al., 2015), or they may lack opportunities to observe certain student behaviors when learning online (Horzum, 2015). Participant response data on the fifth scale item were collected but treated as a missing value during analyses.

Teaching Presence Scale. In 2019, Gurley (2018) reported on a study where they adapted the teaching presence scale from Arbaugh et al. (2008) and changed the wording of the scale items to reflect the perspectives of online instructors about themselves, instead of students about their online instructors (see Table D1 in Appendix D). Gurley (2018) measured how instructors perceived their role in the online learning environment

as it pertained to teaching presence. I adopted the thirteen teaching presence scale items from Gurley (2018) because this study focused on instructors' perspectives of an online learning environment and the elements of the COI constructs (i.e., teaching, social, and cognitive).

The teaching presence scale had thirteen questions and included three subscales (i.e., course structure, facilitation of student learning, and direct instruction and feedback). Course structure included course design and organization statements, which asked participants to rate themselves on how well they thought they presented course goals, topics, and expected due dates to their online students. Facilitation of student learning activities pertained to how well they felt they encouraged and engaged students with course, content, and others in the online learning environment. Direct instruction and feedback pertained to how well instructors felt they provided direct instruction of course materials and offered timely feedback to students in their online learning environments.

Social Presence Scale. The social presence scale originated from Arbaugh et al. (2008). The social presence scale included nine items and three subscales. Subscales included emotional expression, open communication, and group cohesion (see Table D2 in Appendix D). Emotional expression included three questions asking about students' behaviors in an online learning environment when learning with others. The three items for the open communication subscale included questions that asked about how the instructor perceived the comfortability of students when engaged in open communications in the online course when engaged with others (i.e., teacher(s), classmates, and or tutors). The group cohesion subscale also included three questions,

which asked about student behaviors when engaged in discussions with others in the online learning environment.

Cognitive Presence Scale. The cognitive presence scale also originated from Arbaugh et al. (2008). The cognitive presence scale included thirteen questions across four subscales (see Table D2 in Appendix D). The four subscales for cognitive presence included triggering event, exploration, integration, and resolution. Each subscale had three scale items each. The three scale items for triggering event were focused on learning activities that triggered students to think about course and content. The exploration subscale had three items focused on instructors' perception of students' cognition when interacting with content, course, and resources. The integration subscale also had three scale items, which focused on the instructor's observation of students' ability to construct, reflect, and demonstrate knowledge gained from the online instruction, interacting with content, and engaging in learning activities. Finally, the three items of the resolution subscale focused on the instructors' observation of students' ability to transfer knowledge gained from online instruction and interacting with others to others facets of academia.

For this study, I altered twenty of the twenty-one questions provided by Arbaugh et al. (2008), which make up the social presence and cognitive presence scales. The twenty questions were adapted to reflect instructors' views of their students. For example, I changed "Learning activities helped me construct explanations/solutions" to "Learning activities helped students construct explanations/solutions." Scale items, which included words such as "other participants" or "some course participants" were replaced with "student" or "students." For example, "I felt comfortable interacting with other course

participants” was altered to “Students felt comfortable interacting with other course participants.” I also replaced words “course participants” with “student” or “students.” One question from social presence was not altered. “Online or web-based communication is an excellent medium for social interaction” was not changed because it was not person-specific. See Tables D1 and D2 in Appendix D for all word changes.

Online Instructor Profile

For this study, I designed eighteen questions specially for collecting data to build a profile of the characteristics of online educators, which included demographic data, online learning environments, and pedagogical practices of online educators teaching DE courses. Sixteen questions were designed to collect quantitative data and used in answering research questions 1, 1a, 1b, 1c, 1d, and 2). Quantitative questions were designed to identify participant demographic data, course environment data, data on the different methods used by online educators to communicate online course goals, engage in online student discussions, provide online feedback to students, and pedagogical practices (e.g., how often educators engaged in online student discussions during a semester).

The remaining two questions on the survey included in the online instructor profile section were used to answer research questions four and five. These two questions are open-ended and designed to collect qualitative data to be used for open coding analysis (Saldaña, 2016). Open-ended questions were used to gain insight into the teaching and learning in online DE online learning environments.

In this section, I first described questions on the survey, which were used in data collection on demographics, course environments, communication methods, and

frequency of engagement in student discussions. Response data were then separated into groups. Next, I described the process used to two open-ended questions used to collect data, which identified successes and challenges of online teaching and student learning, and instructors' views on instruction and teaching practices used in their online learning environments during COVID-19.

Demographics Questions. Online Instructors Profile questions were designed to collect demographic data. Demographic questions were designed to collect data used to form groups that were used in quantitative analysis. Question types included selecting the best choice and fill-in-the-blank type questions. Groups included age, ethnicity, gender, years teaching online, years teaching developmental courses, online teaching certification status, and employment status. Groups for this study were derived from literature. For example, literature reports that age, gender, and ethnicity influence students' online engagement in a COI (Coker, 2018; Lewis et al., 2015; Mirke et al., 2019; Weinkle et al., 2020; Wladis et al., 2014). Research also indicated that years of experience, employment status, and online training or certification could influence student engagement in online learning (Martirosyan et al., 2017).

Online Learning Environment Questions. There were five questions that were designed to collect data about the online learning environment. The online learning environment questions were "select the best choice" and "select all that apply" questions with an option to add text in an "other" category. Response choices were used as grouping variables. Grouping variables were designed to represent the diverse types of online learning environments found in postsecondary education. Grouping variables were

course delivery method, corequisite status, subject(s) taught, institution type, and course status during spring semester 2020.

Instructor Engagement in Online Discussions. To collect data from participants about their experiences, one question was designed to collect quantitative data on the frequency of engaging with students in online discussions. This question was a “select the best choice” question where data were derived from participants choosing only one choice. Choices included, “I find that I engage in academic and social online discussions with students throughout the semester”, “I find that I engage in academic and social online discussions with students at the beginning of a semester and then taper off towards the middle or end of the semester,” and “I do not engage in academic and social online discussions with students.” Choices represented categorical data and were used in quantitative analysis. This question was derived from research and added to the research design to help determine the role of the online educator and how they perceived the COI constructs. Research indicated that instructors participated throughout the semester, at the beginning than tapered off, or did not participate in student online discussions (Offenholley, 2012).

Online Communication Methods. There were three questions on the Online Instructors Profile that were designed to collect quantitative data about the different communication methods used by online educators to convey online course information (e.g., goals, objectives, and due dates) to students when facilitating student learning activities and when providing online feedback to students. The three questions were “select all that apply” questions and they were designed with a predetermined list of methods used in online courses to communicate course information, facilitate student

learning activities, and when providing feedback to students. The predetermined list included emails, phones, video meetings, forums, social media, chatrooms, course websites, blogs, and notes on assignments. I also added an “other” option for participants to allow them to type in additional communication methods that were not included in the answer choices.

Successes and Challenges of Online Teaching and Learning. I included an open-ended question in the study’s design to capture qualitative data used to answer research question four. This open-ended question was designed to collect data from participants about their successes and challenges of teaching and student learning in online DE courses in higher education. I added this open-ended question to identify trends in online teaching and online student learning in online DE learning environments. By identifying the successes and challenges of teaching and learning online, I could better understand the role of the educators, the pedagogical practices used by instructors, and perceived learning behaviors of students in online DE learning environments.

Effects of Teaching During COVID-19. I included another open-ended question in the Online Instructors Profile which collected qualitative data used to answer research question five. This open-ended question was designed to collect data from online educators about changes in pedagogical practices that were made in response to the COVID-19. Due to health concerns attached to the pandemic, many courses transferred from on-campus, in-person delivery methods to distance education online methods (Greenhow et al., 2022). By adding this open-ended question, I was able to collect data from participants about their views and practices of teaching online. I was also looking for changes in pedagogical practices, beliefs, and attitudes of teaching online versus in-

person. I wanted to know how the pandemic affected participants pedagogy practices and or beliefs of teaching and learning online. Research indicated that instructors who moved from in-person teaching to teaching online and then back again to in-person teaching, saw value in techniques used in online courses and adapted online teaching practices to be used in their in-person courses (Cafarella, 2014).

Data Collection

In this section I discuss the data collection methods, protocol information, and timeline for this study. This section starts with a discussion on the data collection survey and then provides information on the timeline for this study.

Online Data Collection Survey

Data for this study was collected using an online survey. I used Qualtrics XM to create the online data collections survey. I chose Qualtrics XM because of the security features and export functions of the program. Settings in Qualtrics XM allowed me to provide a secure link for educators to access the survey and participate in this study. The survey was not open to the public, and participants needed a link to access the survey. Limiting access to the survey link allowed me to control the target population, resulting in a stratified random sampling of data. The target population for this study included educators who taught online and taught DE (i.e., math, English, reading, writing, learning frameworks, and corequisite) courses.

This study included 52 items: 34 Likert scale questions from COI scales, six questions from the instructor profile questionnaire, and two open-ended questions. Questions were uploaded to Qualtrics XM, a secure online survey tool.

Once the questions were uploaded to the online Qualtrics survey, I invited three colleagues with experience in higher education online teaching and learning to view the survey for time commitments (i.e., how long it took to complete all 52 survey questions) and readability issues. The survey took colleagues about 15 to 20 minutes to complete. There were no major changes to questions needed.

Timeline

The start date for this study was contingent on the IRB approval. The IRB was approved (# 7749) on May 5, 2021 (see Appendix B) for more IRB information. Data collection for this study ran from June 2021 to December 30, 2021. The end date for this study was contingent on a minimum sample size needed ($N = 65$) to validate data and make inferences about the target population. Because the research design included measuring data on three individual scales (i.e., teaching presence, social presence, and cognitive presence), a rule of thumb, used by researchers for assessing the reliability of a scale, is a minimum of five participants per scale item (Field, 2013). The largest number of items in any scale for this study was thirteen, resulting in a minimum of sixty-five participants at the five participants per-item rule, required for this study's research design. A minimum sample size of sixty-five participants was reached at the end of December 2021.

Data Analyses

In this section, I discuss the method used to process and clean data for analyses. I then discuss the two phases of data analyses (i.e., preliminary, and primary analyses) that were used to prepare and analyze the data used to answer the research questions.

Processing Data

In this section, I provide the process used to check participants' response data from the 52 quantitative questions in the online Qualtrics survey for inclusion criteria and data entry errors. To process the data for inclusion criteria, missing data, and data entry errors, I downloaded the quantitative participant response data from the 52 quantitative questions of the online Qualtrics survey to SPSS (version 27, 64-bit edition) to a secured computer. I downloaded the qualitative data (i.e., two open-ended questions) to Microsoft Excel 365 MSO (version 2204, 64-bit). To make note here, I did make a back-up copy of the original data files, for both SPSS and Excel, and uploaded the files to a secure institutional server.

Cleaning Data

I examined the quantitative data in SPSS data view. I wanted to identify data cases that did not meet the study's criteria, had irregular patterns, missing data, and or errors in data entry. The data file included 96 cases. I first scanned the 96 cases to identify participant response data that met the study's criteria. For example, participants had to identify that they met one of the two following criteria. Criterion one had participants identify whether they taught developmental courses (i.e., math, reading, writing, English, learning frameworks and/or corequisites) and courses taught were conducted in postsecondary institutions (i.e., community college, university, and or trade school). Criterion two required that the course(s) had to be delivered online (asynchronous or synchronous) and not in-person on a campus. The courses had to be solely taught online.

I found that 96 people accessed the online Qualtrics survey, however, only 65 people met criteria and offered enough information to be included as participants in this study. I did not use participant data from those who did not provide enough information for establishing eligibility ($n = 31$). For example, data from participants who did not answer the questions that identified the subject taught, or if the subject taught was not a developmental course, or if a corequisite instructor was teaching a course paired with a DE course, was not included in the data set, and was deleted. Thirty-one cases were not included in all. Of those, twenty-eight people accessed the online Qualtrics survey but did not answer any questions. Two people started the survey but did not complete enough of the survey questions to qualify for study inclusion. One person did not teach a DE course; therefore, they did not meet the study's inclusion criteria. I deleted 31 data cases in total from the data set, leaving a total of sixty-five cases that met all criteria for this study.

Next, I scanned the response data for the remaining 65 participants for irregular patterns. I first looked at the 34 Likert scale questions of the COI scales for consecutive patterns (1, 2, 3, 4, 5, 1, 2, 3, 4, 5, or 1, 1, 5, 5, 5), data entry errors, and missing data. I did not find any irregular patterns, data entry errors, or missing data. All sixty-five participants answered all 34 questions, using values from 1 to 5. Next, I examined the data collected for the sixteen questions specifically designed for gathering participant demographics, course delivery methods, and learning environments, pedagogical practices, and communication methods. I did not find any irregular data or data entry errors.

I then examined the response data on the open-ended question asking about the successes and challenges of teaching and learning in DE online learning environments.

Sixty-three participants responded to the question. Responses from six participants were unusable. The six responses were not included in the data analyses. Reasons for response exclusions included direct remarks to the researcher on additional resources, vague responses that had little information, and responses that did not answer the question asked.

Sixty-two participants answered the open-ended question that asked participants to briefly describe how COVID-19 had affected their views and teaching practices of teaching and student learning in DE online learning environments. Response data for 52 participants were used in analysis. Response data from ten participants were unusable because their responses either did not answer the questions or were too vague to find meaning.

Preliminary Analyses

Preliminary analyses were conducted to prepare data for primary analysis used to answer the research questions. The preliminary analyses included conducting descriptive statistical analyses, factor analysis, and creating new variables based on the analyses results. Preliminary analysis also included testing for normalcy and outliers in the quantitative data. Preliminary analysis results are recorded in chapter four under the corresponding title. A discussion and rationale for the analyses and tests used in preliminary analyses are as follows.

Descriptive Analysis

Descriptive analyses were used to prepare data for answering research questions 1, 1a, 1b, 1c, 2 and 3. Research questions 1a, 1b, 1c, and 2 required comparing data between groups. I conducted descriptive analyses to identify the frequency (i.e., sample

size) of participants response data for each answer choice (i.e., category) on each question to determine group membership of demographic and online learning environment data. I examined the frequency of response data from participants, on answer choices to questions, to determine group membership. Group memberships were formed by examining and at times combining categories to make larger groups. For this study, I was able to form fourteen groups by combining answer choices for domestic questions (i.e., age, years teaching online, and years teaching DE) and online learning environment questions (i.e., learning institutions, teaching status pre-pandemic, corequisite course). Groups were assigned a dichotomous value (0 or 1) and used in primary analyses. I did not create groups for gender, ethnicity, online certification status, employment status, and subject taught because I could not combine answer choices to improve the sample size for each group for adequate analyses. Results on grouping variables can be found in chapter 4 under preliminary analysis results.

Exploratory Factor Analyses

Three exploratory factor analyses were conducted to examine participant response data using the Likert scale choice data (i.e., 1 strongly agree; 2 somewhat agree; 3 somewhat disagree; 4 strongly disagree) for the 34 questions of the COI scales (i.e., teaching presence, social presence, and cognitive presence). I changed items on each of the scales from the original scales and needed to check each scale for validity and reliability. Response data for the three COI scales underwent exploratory factor analyses to determine the validity of the factor loading values on each scale and compared to the validity values of Albaugh et al. (2008) on social ($\alpha = .91$) and cognitive ($\alpha = .95$) presence and Gurley (2018) on teaching presence ($\alpha = .852$) to see if this study mirrored

their validity values. Also, Gurley (2018) found low validity for direct instruction and feedback scale items and discarded them in their study. I wanted to see if teaching presence scales had three scales or found that direct instruction and feedback were like what Gurly (2018) found in their results.

Teaching Presence Scale. For this study, I conducted an exploratory factor analysis on the three subscales of teaching presence (see Table E1 in Appendix E) to find initial loading factors. In theory, the teaching presence scale has thirteen questions included in three subscales (i.e., course design and organization (course structure); facilitation of student learning activities; and direct instruction and feedback (Gurley, 2018). I wanted to identify what items loaded on what subscale. Items in the course structure subscale included questions that asked participants about how well they thought they presented course goals, topics, and assignment due dates to their online students. Items on facilitation of student learning activities asked participants on how well participants thought they engaged in student online learning activities. Direct instruction and feedback items included questions asking instructors about their ability to provide feedback and direct instruction to students.

Social Presence Scale. I conducted an exploratory factor analysis for the three subscales of social presence to see what items loaded on factors (see Table E2 in Appendix E). Social presence scales included nine items in three subscales (emotional expression, open communication, and group cohesion). In theory, there are three questions per subscale when measuring student perceptions about learning (Arbaugh et al., 2008). As previously mentioned in this chapter, my study explored the perceptions of online educators and not on students, so the items for social presence were adapted to

reflect educators' perspectives and not students. For this study, emotional expression subscale items asked participants about students' behaviors when learning online with others (e.g., feel comfortable in engaging with others). Open communication subscale included questions that asked instructors how they perceived students when engaged in open communications with others (e.g., sharing work, information, and views), in the online course. The group cohesion subscale items asked participants about their perceptions of student behaviors when engaged in learning activities (e.g., collaborating), with others, in online learning environments.

Cognitive Presence Scale. The cognitive presence scale included twelve items and four subscales (triggering event, exploration, integration, and resolution). In theory, cognitive presence had twelve items in four subscales (Arbaugh et al., 2008). Cognitive presence items were adapted to fit this study's focus. Subscales had three items each (see Table E3 in Appendix E). The three items for the triggering event subscale focused on learning activities that triggered students to think about course and content. The exploration subscale had three items, which focused on the instructors' perception of students in displaying cognition when interacting with content, course, and resources. The integration subscale also had three items, which focused on the instructor's observation of students' ability to construct, reflect, and demonstrate knowledge gained from interacting with course, content, and learning activities. Finally, the three items of the resolution subscale focused on the instructors' observation of students' ability to transfer knowledge gained from the online course, content, and interacting with others and ability to transfer knowledge gained to other facets of academia.

The exploratory factor analyses produced data (i.e., mean value scores) for primary analysis and was used to answer questions 1a, 1b, 1c, and 1d of this study. Results for the exploratory analyses can be found in chapter 4 under preliminary analyses results.

Testing for Normality

I conducted a Kolmogrove-Smirnov normality test on data gained from the factor analyses (dependent variables) and groups (independent variables). Normality tests were conducted to determine what type of statistical analysis (i.e., parametric, or nonparametric analysis) was needed for primary analyses (Field, 2013). Data did not reach normality, so I used nonparametric analysis to answer research questions 1a, 1b, 1c, 2, and 3 of this study. Results for normality tests can be found in chapter 4 under preliminary analyses results.

Primary Analyses

Primary analyses were used to answer the five research questions and three sub-research questions for this study and based on preliminary analyses results. Preliminary analyses revealed that normality could not be reached. Literature suggests that when normality could not be reached, nonparametric analyses were more appropriate for analyzing data than parametric analyses (Field, 2013). Parametric analysis requires that data meet certain assumptions (Field, 2013). One assumption requires data to be normally distributed (i.e., no skewness or extreme outliers). Since this study failed to meet normality, nonparametric analyses were used in primary analyses to answer the research questions.

In this section, I first supply a table that identifies each research question, data source used in analyses, and analyses used to answer each research question (see Table 2). I also indicate the dependent and independent (i.e., grouping variables) when applicable. Next, I explained each analysis used to answer each research question. Results for analyses are recorded in chapter 4 under primary analyses results.

Table 2: Research Questions and Analyses

Research Questions and Analyses					
RQ#	Research Questions	Analysis	Dependent Variables	Independent Variables	Data Source
1	How does the COI framework describe instructor perceptions of online teaching within developmental education courses?				
1a	How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?	Mann-Whitney U	Teaching presence scales - mean values Social presence scales -mean values Cognitive presence scales - mean values	Demographic groups	Instructors Profile Questions Factor analyses scale mean score for teaching, social, and cognitive presence
1b	How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?	Mann-Whitney U	Teaching presence scales - mean values Social presence scales -mean values Cognitive presence scales - mean values	Online learning groups	Instructors Profile Questions – demographics and learning environments. Factor analyses scale mean scores for teaching, social, and cognitive presence.
1c	How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?	Spearman's Rho Pearson's r	Frequency of engagement full- semester partial-semester not at all	Teaching presence scales - mean values Social presence scales -mean values	Instructors Profile - Question on engagement in student discussions. Factor analyses scale mean scores for teaching,

Table 2: Research Questions and Analyses

Research Questions and Analyses					
RQ#	Research Questions	Analysis	Dependent Variables	Independent Variables	Data Source
				Cognitive presence scales - mean values	social, and cognitive presence.
2	What are the differences in levels of engagement in student discussion by demographic group and learning environment?	Mann-Whitney U	Frequency of engagement full- semester partial-semester not at all	Demographic groups Learning environment groups	Instructors Profile - Question on engagement in student discussions.
3	What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?	Frequency Distribution			Instructors Profile - Question select-all that-apply for each communication method: goals, discussions, and feedback.
4	What successes and challenges do online developmental educators encounter in their online courses?	Open Coding – Emergent Codes and Categorized groupings			Participant response data from the open-ended question on success and challenges of engaging students in online discussions.
5	How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?	Open coding Analysis – Emergent Codes and Categorized groupings			Participant response data from the open-ended question asking about effects of the pandemic on teaching online and student online learning.

Nonparametric Analyses

I used nonparametric analyses to conduct statistical tests on quantitative data collected from the preliminary results of the exploratory factor analyses, descriptive analyses, and Online Instructors Profile questions. Data from the preliminary analyses included scale mean scores obtained from the factor analyses (i.e., mean value scores for teaching presence scale, social presence scale, cognitive presence scale) and descriptive analyses (i.e., demographic groups and learning environment groups). Data gathered from the Online Instructors profile included how often participants engaged in student online discussions (i.e., fully engaged, partial engaged, or no engagement). Nonparametric tests were performed on data to answer research questions 1a, 1b, 1c, 2, and 3. A discussion of each type of analysis follows.

Mann-Whitney U Test

The Mann-Whitney U tests were used to answer research questions 1a, 1b, and 2. For this study, I used nonparametric analyses to compare group mean values and group rank values to find statistical differences between groups on the dependent variables. The Mann-Whitney U test was conducted on quantitative data derived from the COI scales (i.e., individual mean values per scale) and the seven group sets. Because I could not meet the assumption of normality (see chapter 4 under preliminary analyses) needed to use parametric analyses, I used the Mann-Whitney U test for comparison of independent and dependent variables. The Mann-Whitney U test was used to compare differences between two independent samples (i.e., groups) when the group distribution and sample size ($n < 30$) is small (Field, 2013).

The groups compared in this study included seven sets of groups (i.e., fourteen independent groups), where each set was assigned a dichotomous number (1 or 0), and each group ranged between 25 and 33 in sample size (see chapter 4 under preliminary results for group membership and sample sizes). The independent groups were derived from the preliminary analysis and consisted of demographic and learning environment groups. Mann-Whitney U calculated the mean rank for each group (Field, 2013) and compared each group rank on the dependent variables. Dependent variables included the mean score values for each of the COI scales and the frequency of engagement in student online discussions during a semester. Results for the Mann-Whitney U and group comparisons are recorded in chapter 4 under primary analyses results.

Spearman's Rho

I used Spearman's Rho to answer research question 1c. Data that represented the independent variables used to answer research question 1c was derived from the preliminary analyses that underwent exploratory factor analyses, in preliminary analyses, to produce mean score values for each of the COI scales. Data for the dependent variable (i.e., how often educators engaged in student online discussions) was derived from the Online Instructors Profile questions and included the quantitative question that asked participants to select-best choice from a list of three choices (i.e., fully engage, partially engage, did not engage). I chose Spearman's Rho because of its ability to compare more than two groups, where Mann-Whitney U compares only two groups. Spearman's Rho is the nonparametric version of Pearson's r (i.e., a parametric test) and should be used instead of Pearson's r when parametric assumptions (i.e., normality and minimal outliers) cannot be met (Field, 2013). Even though the data did not meet normality and non-

parametric analyses were used, some researchers suggest conducting and reporting on both nonparametric and parametric results to see if there are differences between the two tests, so readers can decide for themselves the validity of data (Field, 2013). For this reason, I also conducted a Pearson's r test so I could compare the differences between the two types of tests. If the results from Spearman's Rho is like those in the Pearson's r tests, then the results could be more generalizable (Field, 2013). Results are shown in chapter 4 under primary analyses results.

Controlling for Inflation of Type 1 Error

Because I conducted so many analyses on each variable, I felt it important to specifically control for inflation of type 1 error. To control the inflation of type 1 error, I reduced the statistical significance level to $\alpha \leq .01$, instead of using the default value of $\alpha \leq .05$ (Field, 2013) when conducting the Mann-Whitney U, Spearman's Rho, and Pearson's r tests. I ran analyses using both .01 and .05 values; however, only $\alpha \leq .01$ was considered statistically significant for this study.

Descriptive Analyses

Descriptive analyses were used to calculate the frequencies and percentages of the independent variables (e.g., domestic, and online learning environment groups) on the dependent variable (e.g., pedagogical practices). Results from the descriptive analyses were used to answer research question three to identify which communication methods were being used by online educators to communicate course information, engage students in online discussions, and provide online feedback to students.

Participant response data from the "select the best choice" question of the Online Instructors Profile was derived from participant responses to the type of communication

methods used by online DE instructors in their online learning environments to communicate course information, facilitate student learning activities, and offer feedback to students. Participants were asked to select all that apply from a predetermined list of nine choices, or they could add methods that were not on the list by selecting the “other” field and typing in other communication methods (see Appendix C). Communication methods included three questions with nine preselected answer choices based on literature as methods used by online educators and an added “other” textbox option. The preselected categories for all three questions included emails, phone calls, video meetings, forums, social media, blogs, course webpage, chatrooms, notes on assignments and “other.” I added the “other” category because of the vast amount of technology available educators can choose from when communicating online with students. Seven participants utilized the “other” category and entered video messages as a method to communicate online course information, facilitate student learning activities, and when providing online feedback to students.

Open Coding Analysis

Finally, I used open coding to answer research questions three and four (Saldaña, 2016). Data for the open coding analysis included participant response data from the two open-ended questions of the Online Instructors Profile. I used open-ended questions to gain a personal insight into the online instructors’ experiences of teaching and learning online. Open-ended, “fill in the blank” questions allow participants to use their own words to describe their experiences (Colton & Covert, 2007). The two open-ended questions underwent open coding analyses to determine categorized groupings and codes (Saldaña, 2016) associated with the success and challenges of online teaching and

learning in DE online courses and the views of teaching and learning and teaching practices used during COVID-19. A description of each question and analyses follows.

Successes and Challenges of Teaching Online

The first open-ended question asked participants to briefly share their successes and/or challenges of communicating with online students using online methods. Data underwent open coding analysis to uncover categorized groupings in the data on the successes and challenges of teaching and student learning in online courses. Data were used to answer research question four. Results can be found in chapter four under primary results.

Effects on Teaching and Student Learning During COVID-19

The second open-ended question asked participants to briefly describe their views of teaching and learning online and teaching practices used during COVID-19. Research indicates that educators who transferred their courses online changed their views of teaching online, resulting in changing their philosophy of online teaching and online learning (Graham, 2019). During COVID-19 many educators transferred their face-to-face courses to online courses during the spring semester of 2020 due to health concerns attributed to COVID-19 (Greenhow et al., 2022). Participant response data underwent open coding analyses and coded for categorized groupings in the data. Data were used to answer research question five. Results can be found in chapter 4 under primary analyses results.

Data Validation Method

I used a triangulation method of validation to validate the categorized groupings and codes found during open coding on the two open-ended questions. I recruited two

colleagues to serve as raters that helped me identify categorized groupings in the data. Each rater and I conducted separate, individual open coding analyses to answer research questions three and four. We used an open coding analysis procedure where codes were checked repeatedly throughout the analysis process and looking in and between cases for differences and similarities of codes, making sure codes were consistent and accurate (Gibbs, 2007). Raters reviewed twenty-five percent of cases for each question. When in disagreement, raters discussed discrepancies and worked towards 100% agreement.

I set up a secure website and gave each rater access to background documents on the COI theory (see Appendix F) and the Excel spreadsheet with the participant response data. I met with each rater separately through a Zoom meeting to explain my study, research questions, background documents, and Excel spreadsheets.

The two open-ended questions underwent a separate open coding analysis to reveal emergent codes. We explored data for categorized groupings related to the appropriate research question. For research question four, we looked for categorized groupings and codes in the participant responses that identified successes and challenges as it pertained to the COI framework (i.e., teaching presence, social presence, and cognitive presence). Raters used the COI framework to identify categorized groupings aligned with teaching, social, and cognitive presences, and uncover categorized groupings in responses as successes and or challenges in the teaching and learning online in DE online learning environments. Data were coded for research question five to uncover categorized groupings related to views of teaching online and practices used during COVID-19 to teach online DE courses.

Limitations

This study was not without limitations. Sample size and interrater reliability had the biggest potential for limiting the generalization of this study. Additionally, conducting a study during the COVID-19 pandemic required changes to this study's approach, limiting the data gathering method.

Sample Size

The biggest limitation in this study was sample size. A small sample can affect results and the study's generalizability (Field, 2013). Data collections for this study took place during two full summer sessions and one full fall semester. I chose to collect data in the summer because many educators are off and may have more time to engage in a survey, and the fall semester usually has a higher enrollment in DE courses than spring semesters. Even though data collections took place during a fall semester, only 65 people answered enough questions on this study for data analyses. Although a larger sample of over 100 participants would have been preferable, the timing of data collection was during a time of uncertainty in course delivery methods. Many educators were transferring course delivery methods to online in the middle of the spring semester in 2020 due to the COVID-19 (Greenhow et al., 2022). Many educational institutions, practitioners, and students were affected by the pandemic. This could have had an impact on the amount of people engaging in activities not related to the transition such as participating in research studies. Transitioning and uncertainty lasted into the academic year 2021 (Greenhow et al., 2022), which was when data were collected for this study. Also, collecting data, coordinating adequate personal interviews, and scheduling focus

group discussions were not conducted because of health issues and technology issues related to COVID-19. For this reason, open-ended questions were added to this study.

Even though the sample size for this study (N=65) was small, I was able to reduce the number of groups for each category (i.e., domestic, and online learning environments) and conduct analyses on data with a minimal sample size. I was able to run the exploratory factor analysis separately for each COI scale, which increased the sample size per line-item ratios for the teaching presence, social presence, and cognitive presence scales.

This study served as a pilot test for establishing validity for the social presence and cognitive presence scales and affirming validity on teaching presence scale. This study did have a sample large enough to meet the five person per line-item rule of thumb used in instrument validation. Some researchers accept five people as valid (Field, 2013), however, psychometricians may argue scale validation should include at least 10 people per line item (Price, 2007), or 100 to 300 people (Colton & Covert, 2007; Kass & Tinsley, 1979). If following the later rule of thumb, then readers should take caution in the general interpretations given in chapter five.

Another limitation of a small sample size is found with the two open-ended questions, many responses given by participants were vague and needed more clarification. An inability to confirm responses given by participants to the open-ended questions limited the thick description needed to create a more complete picture of teaching and learning in online DE learning environments. The sample size for this study could have been affected by limitations brought on by COVID-19, where many educators were encouraged to teach online, creating

extra work and challenges of learning new technologies, course design, and effective online teaching practices which could limit educators time to participate in other activities, affecting their choice to participate in this study.

Researcher Bias

Another limitation in generalizing the results of this study could occur in how codes and categorized groupings are interpreted. The researcher could influence the study results and invite bias (i.e., interrater reliability) into the coding schemas (Creswell & Creswell, 2018). To reduce researcher bias, I recruited two colleagues to serve as raters, plus myself. The two colleagues were established educators in DE courses, as well as experienced in designing and teaching of both asynchronous and synchronous online teaching methods.

For this study, we rated 25% of the response data cases for each open-ended question. Data cases were rated individually by each rater. Categorized groupings were compared and agreed upon by raters to establish codes used in this study. Raters may interpret data differently depending on how they perceived and articulated participants responses (Creswell & Creswell, 2018). Raters reviewed twenty-five percent of cases for each question. When in disagreement raters discussed discrepancies and worked towards 100% agreement.

Summary of Chapter

In this chapter, I discussed the research design, which included explanations with rationales for research decisions and choices made when answering the research questions for this study. I offered details on the recruitment process used to gather a stratified random sampling of data from a target population. I explained that the

instrument used to gather data included adapted (Arbaugh et al., 2008) and adopted questions (Gurley, 2018) as well as questions created specifically for this study for a specific population (i.e., educators teaching DE online and college readiness courses). Also explained were the preliminary and primary analyses. The preliminary analyses were conducted to identify grouping variables and group mean scores needed for primary analyses. The primary analyses were conducted on quantitative and qualitative data used to answer the research questions for this study. I end this chapter with a discussion on the limitations of this study's design. Even though the sample size was small, all precautions were taken to improve generality for this study. Such as grouping data, testing scales individually, accounting for Type I errors in quantitative analyses, and controlling for researcher bias by using raters in the open coding analyses.

IV. Results

In this chapter, I report the results of the quantitative and qualitative analyses used in this study. For this study, data underwent two phases of analyses. The first phase, the preliminary phase, was conducted to ready data for the second phase, the primary phase. The primary phase included both quantitative and descriptive analyses, which were used to answer the following research questions:

1. How does the COI framework describe instructor perceptions of online teaching within developmental education courses?
 - a. How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?
 - b. How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?
 - c. How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?
2. What are the differences in levels of engagement in student discussion by demographic group and learning environment?
3. What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?
4. What successes and challenges do online developmental educators encounter in their online courses?

5. How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?

I start this chapter by reporting the results found in the preliminary phase of analyses. Next, I give a restatement of the research questions, followed by a report on the results found in the primary phase of analyses.

Preliminary Analyses Results

Preliminary analyses were first conducted to identify data used in the primary phase of analyses. Participant response data collected from the Online Instructors Profile and the COI questionnaire were used in the preliminary analyses. Data from the Online Instructors Profile were analyzed using descriptive statistics, while data from the COI questionnaire were analyzed using exploratory factor analyses to prepare the data for primary data analysis. In this section I discuss the results from those analyses, which also includes normality test results.

Online Learning Environments and Course Subjects

Analysis of the descriptive data were conducted to identify the type of learning environments (i.e., synchronous, asynchronous, mathematics, reading, writing, learning frameworks, corequisite, 2-year institution, 4-year institution) that the population sample were teaching. Data used to identify learning environments were collected from participant responses to five questions from the Online Instructor Profile (i.e., questions created specifically for this study). Table 3 shows data collected for learning environments.

Analysis of the descriptive data revealed that slightly more participants taught reading/writing or English composition (35.4%) than developmental math (30.8%) or learning frameworks courses (23.1%). Additionally, 9.2% of participants taught more than one subject. Synchronous (50.8%) and asynchronous (49.2%) course delivery methods were almost equal. There were more participants who taught in a corequisite course (53.8%) than those who did not (46.2%). More participants transitioned to online teaching during spring 2020 semester (51%) due to the COVID-19 pandemic than those already teaching online (34%) or those planning to teach online (11%) before spring 2020 semester. Lastly, most participants taught at a community college (51%).

Table 3. Frequency Table of Online Learning Environments

Online Learning Environments (N = 65)	<i>n</i>	%
Course Delivery Method		
Asynchronous	32	49.23
Synchronous	33	50.76
Course Subject Taught		
Reading/Writing/English Composition	23	35.38
Math	20	30.76
Learning Frameworks	15	23.07
Math/Read/Write	1	1.53
College Readiness/Read/Write	4	6.15
College Readiness/Math	1	1.53
Missing	1	1.53
Corequisite (paired with college course)		
Corequisite	35	53.84
Not corequisite course	30	46.15
Online Status of Course		
Online pre-COVID-19	22	33.84
Plans to be online pre-COVID-19	7	10.76
Emergency Remote Online Course	33	50.76
Not sure if course was online pre-COVID-19	1	1.53
Missing	2	3.07
Type of Learning Institution		
Community college	33	50.76
University	20	30.76

Table 3. Frequency Table of Online Learning Environments

Online Learning Environments (N = 65)	<i>n</i>	%
Community college & university	1	1.53
Trade-school	1	1.53

Pedagogical Practices of Engaging in Student Online Discussions

Analysis of the descriptive data were conducted to identify the online instructors' pedagogical practices of engaging in online discussions with students. Data for pedagogical practices were derived from participant responses to the Online Instructor Profile questionnaire, which asked about the participants' frequency of engagement in student online discussions (i.e., throughout the semester, partial semester, or not at all). Table 4 shows the descriptive analyses result on how often online developmental educators were engaging in online student discussions with their students. Results revealed that most instructors engaged in student discussions (89.2%). There were more instructors who engaged throughout the semester (64.6%) in student discussions than instructors who engaged in discussions at the beginning of the semester and then tapered off towards the middle of the semester (25%). Eight percent of the instructors did not participate in student online discussions and three percent of the instructors did not answer the question.

Table 4. Frequency Table of Instructor Engagement in Student Discussions

Engages in student discussions (N=65)	<i>n</i>	%
Throughout the semester	42	64.6
Beginning of semester and taper off in the middle	16	24.6
Do not participate in student discussions	5	7.7
Missing	2	3.1

Online Communication Methods

An analysis of the descriptive data were conducted to identify the types of communication methods used by instructors teaching online developmental courses. Data for online communication methods were derived from participant response selections on three questions of the Online Instructor Profile questionnaire. The three questions asked participants to select all methods (i.e., virtual meeting, email, class website, notes on assignments, discussion boards, phone calls, chatroom, video message, blog, social media) that they have used when communicating course information to students (e.g., goals, objectives, due dates), providing feedback to students, and facilitating student discussions in their online courses. Table 5 shows the results of the analyses. Analysis of the descriptive data revealed that online educators used various methods to communicate with students, however, some methods were used more frequently than others. The percentage for online instructors who emailed students to provide course information (85%) and feedback (75%) ran a close second to virtual meetings to provide information (89%) and feedback (77%). More instructors used virtual meetings and emailing to communicate course information and provide feedback to students but not for engaging students in online discussions. Forums were the most used method for engaging students in online discussions, followed by virtual meetings (72%). Also, class websites (40%) were used more than emails (29%) for engaging students in online discussions. The communication methods that were used least often by online developmental educators when providing course information, feedback, and when facilitating student online discussions included blogs, social media, and video messages.

Table 5. Frequency Table of Online Communication Methods

Online Communication Method (N = 65)	Providing Course Information		Providing Feedback		Facilitating Online Student Discussions	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Virtual Meeting	58	89.2	50	76.9	47	72.3
Email	55	84.6	49	75.4	19	29.2
Class Website	47	72.0	40	61.5	26	40.0
Notes on Assignments	40	61.5	45	69.2	13	20.0
Discussion Board	38	58.5	36	55.4	51	78.5
Phone Call	18	27.7	18	27.7	7	10.8
Chatroom	7	10.7	9	13.8	13	20.0
(Other) – Video Message	7	10.7	4	6.15	1	1.5
Blog	2	3.1	2	3.1	4	6.2
Social Media	1	1.5	2	3.1	2	3.1

Groups

The information from the descriptive data helped me gain an overview of the participants, which was used to form groups (i.e., independent variables) needed for comparison analyses. I looked at the sample sizes for each item (response choices) selected by participants to form groups. For example, the question that asked about the participants' age had four data response items, I combined the response items to form as few groups as possible, which increased group membership sizes that were used for primary analyses. Table 6 shows the combined categories (i.e., grouping variables). I combined response items to form two groups (group membership) of the following: age, learning institutions, corequisite, COVID-19, years teaching online, and years teaching developmental education courses. Each group was assigned a dichotomous value (0 or 1) and was used in primary analyses. Because of the diverse nature of the population sample and the many item choices per question, ethnicity, gender, employment status, and online certification status could not be combined to make larger group sizes needed for analyses.

Ethnicity, gender, employment status, and online certification status were not used in analyses for this study. Table 6 shows all groups and groups sample size retained in this study that were used in primary analyses to answer the research questions.

Table 6. Profiles with Groups and Group Memberships

Profiles	Groups (N)	Group Membership (<i>n</i>)
Demographic Profile	Age (63)	< 50 years of age (34) ≥ 50 years of age (29)
	Years Teaching Online (63)	≤ 2 years (26) > 2 years (37)
	Years Teaching DE (64)	≤ 10 years (35) > 10 years (29)
	Course Delivery Method (65)	Asynchronous (32) Synchronous (33)
Learning Environment Profile	Learning Institutions (64)	2-year institution (34) 4-year institution (30)
	COVID-19 Group (62)	Traditional Online (29) Emergency Remote (33)
	Corequisite Course (65)	Corequisite (35) Not Corequisite (30)

Exploratory Factor Analyses

The preliminary analysis continued with an exploratory factor analysis which identified factors that reflected the sample populations' perceptions of the COI constructs. Exploratory factor analysis was conducted on participant response data from the COI questionnaire. Data were analyzed to identify subscales in each teaching presence, social presence, and cognitive presence scales. Factor loading values were used to identify the individual sub-scales in each of the three presence scales. The factor loading values for each subscale were used to define factors and form mean score values per subscale, which were used in the primary analyses to answer research questions 1a, 1b, and 1c of this study. The results from the exploratory factor analysis, which defined the subscales for teaching presence, social presence, and cognitive presence, are as follows.

EFA 1: Teaching Presence

There were thirteen items in the teaching presence scale, which was theorized (Arbaugh et al., 2008; Gurley, 2018) to comprise three subscales (i.e., course structure, facilitation of student activities, and feedback). The thirteen items of the teaching presence scale underwent an initial principal axis factor analysis with an oblique rotation (Promax with Kaiser normalization) to uncover the items that loaded on each subscale (i.e., factor). Oblique analysis was used because there was a theoretical assumption that the subscales would be correlated. An initial analysis was conducted to obtain eigenvalues for each factor in the data (see Table E4 in Appendix E). Three factors had eigenvalues over Kaiser's criterion of 1 and in combination explained 62.159 % of the variance. Individual Kaiser-Meyer-Olkin (KMO) ranged between .460 and .797 in value. The pattern matrix showed four factors (see Table E1 in Appendix E), however, the scree plot (see Figure E5 in Appendix E) was found to be ambiguous. Fluctuations in the plot would justify retaining either two or ten factors.

I reran the factor analysis, forcing a three-factor solution. The three-factor solution revealed that only two items (12 and 13) loaded on factor 3 (i.e., feedback subscale) and both were below the accepted Cronbach's alpha (.8). The feedback subscale, with two items, was questionable, especially when the Cronbach's alpha for the two ($\alpha = .584$) were below the accepted .8 value (Field, 2013). There are occasions where two items can represent a scale but only if Cronbach's alpha scores are acceptable (.8 or above) and theory supports the items as items that represent what you want to measure (Field, 2013). Theoretically items 12 and 13 made sense, however, because the alpha value was below the acceptable value for factor 3 (i.e., items 12 and 13), I removed factor

3, the feedback subscale, from the analysis. I then reran the principal axis factor analysis and used eigenvalues of 1 as a criterion. I retained a two-factor solution (i.e., facilitation of student discussions and course structure) with a simple structure for the overall teaching presence scale.

Table 7 shows a two-factor solution for the teaching presence scale with eigenvalues over Kaiser's criterion of 1 and, in combination, explained 56.473% of the variance. The KMO for the overall scale improved after the removal of items 12 and 13 (KMO = .754). The KMO measure verified the sampling adequacy for the analysis as "middling" (Field, 2013, p. 685). All individual KMO values ranged from .596 to .823, well above the accepted value (Field, 2013). The Cronbach's alpha for the overall teaching presence scale was acceptable (.843). In Table 7 all items that clustered on factor 1 represented the facilitation with student learning activities subscale and items that clustered on factor 2 represented course structure subscale of teaching presence.

When testing the teaching presence subscales for internal consistency, the overall KMO (.715) and Cronbach's alpha ($\alpha = .843$) were acceptable for the overall scale (Field, 2013). The individual Cronbach's alpha scores (see Table 7) for each subscale for teaching presence were close to values found by Gurley (2018). Organization and design (i.e., course structure), and facilitation of student learning activities, both had high Cronbach's alpha scores of ($\alpha = .788$; $\alpha = .808$ respectfully), however, Gurley (2018) had a low Cronbach's alpha of .377 for direct instruction and feedback (Gurley, 2018, p. 206). Gurley (2018) omitted the direct instruction and feedback scale from further analysis because of the low alpha score. I also omitted the direct instruction and feedback subscale (feedback); however, I did retain one item from the feedback scale that loaded

on the facilitation of student learning activities subscale. After identifying the two teaching presence subscales, I calculated the mean score, individually, for each subscale and saved the mean scores as two new variables. The new variables were used in primary analyses used to answer research questions 1a, 1b, and 1c of this study.

Table 7. EFA 1: Teaching Presence Scale

Scale Items	Pattern Matrix ^a	
	Factors	
	Facilitation of Student Discussions	Course Structure
10. Overall, my actions reinforce the development of a sense of community among course participants.	.850	-.200
9. Overall, I encourage course participants to explore new concepts in courses.	.719	-.024
7. Overall, I help to keep course participants engaged and participating in productive dialogue.	.686	-.074
6. Overall, I am helpful in guiding the class towards understanding course topics in a way that helps students clarify their thinking.	.670	.222
11. Overall, I help to focus discussion on relevant issues in a way that helps students to learn.	.663	-.007
5. Overall, I am helpful in identifying areas of agreement and disagreement on course topics that help students to learn.	.569	.131
8. Overall, I help keep the course participants on task in a way that helps students learn.	.530	.020
2. Overall, I clearly communicate important course goals.	-.059	.778
1. Overall, I clearly communicate important course topics.	.132	.714
4. Overall, I clearly communicate important due dates/time frames for learning activities.	-.172	.606
3. Overall, I provide clear instructions on how to participate in course learning activities.	.074	.597
Eigenvalue	4.483	1.729
% Variance	40.756	15.718
a	.721	.848

Table 7. EFA 1: Teaching Presence Scale

Pattern Matrix ^a		
Scale Items	Factors	
	Facilitation of Student Discussions	Course Structure
<i>Note.</i> $N = 52$. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading values above .4 appear in bold. Adapted from Gurley, L. E. (2018). Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. <i>Online Learning</i> , 22(2), 197–220. Adopted from a. Rotation converged in 3 iterations.		

EFA 2: Social Presence

There were nine items in the social presence scale, which was theorized (Arbaugh et al., 2008) to comprise three subscales (i.e., open communication, groups cohesion, and affective expression). The nine items of the social presence scale underwent a principal axis factor analysis with an oblique rotation (Promax with Kaiser normalization). The KMO measure verified the sampling adequacy for the overall social presence scale (KMO = .808) and Cronbach's ($\alpha = .835$) was above .8 and considered adequate (Field, 2013). The analysis revealed two factors had eigenvalues over Kaiser's criterion of 1 and in combination explained 65.28% of the variance (see Table E6 in Appendix E. The scree plot was ambiguous and showed two or five factors (see Figure E7 in Appendix E). When examining the initial loading values (see Table E2 in Appendix E), items 3 and 7 cross loaded across two factors with similar values. The loading values for item 7 were well below the recommended .5 value (Field, 2013). I removed items 3 and 7 and reran the principal axis analysis (see Table 8). With items 3 and 7 removed, the overall social presence scale KMO value went down from .808 to .785 but remains well above the acceptable value of .5 (Field, 2013). The overall Cronbach's alpha for the remaining seven social presence scale items (see Table 8) were above the acceptable value of .8 (α

= .835). The two-factor solution showed a simple structure (see Table 8). In Table 8 the items clustering on factor 1 reflect the educators' perceptions of their students' comfort of engagement with course, discussions, and others and named to reflect this perception. Items clustering on factor 1 represent the comfort of engagement subscale of the social presence scale. Items that clustered on factor 2 reflected the educators' perceptions of their students in establishing interconnectedness and group cohesion and named to reflect this perception. Items clustering on factor 2 represent the establishing group cohesion subscale of the social presence scale.

After identifying the two social presence subscales, I calculated the mean scores, individually, for each subscale and saved the mean scores as two new variables. The new variables were used in primary analyses used to answer research questions 1a, 1b, and 1c of this study.

Table 8. EFA 2: Social Presence Scale

Scale Item	Pattern Matrix ^a	
	Factor	
	Comfort of Engagement	Establishing Group Cohesion
5. Students felt comfortable participating in the course discussions.	.933	-.150
4. Students felt comfortable conversing through the online medium.	.820	-.041
6. Students felt comfortable interacting with other course participants.	.776	.187
2. Students were able to form distinct impressions of some course participants.	-.183	.826
9. Online discussions helped students develop a sense of collaboration.	.088	.736
8. Students felt their point of view was acknowledged by other course participants.	.183	.707
1. Getting to know other course participants gave students a sense of belonging in the course.	.055	.604
Eigenvalues	3.602	1.475
% Variance	51.462	21.067
α	.904	.804

Table 8. EFA 2: Social Presence Scale

Scale Item	Pattern Matrix ^a	
	Factor	
	Comfort of Engagement	Establishing Group Cohesion
<i>Note.</i> $N = 51$. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading above .4 are in bold. Adopted from Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, R., Ice, P., Richardson, J., Shea, P., & Swan, K. (2008). Community of inquiry framework: Validation and instrument development. <i>The International Review of Research in Open and Distributed Learning</i> , 9(2), 133–136 (https://doi.org/10.19173/irrodl.v9i2.573).		
a. Rotation converged in 3 iterations.		

EFA 3: Cognitive Presence

There were twelve items in the cognitive presence scale, which was theorized (Arbaugh et al., 2008) to comprise four subscales (i.e., explore, triggering event, integration, and resolution). A principal axis factor analysis with an oblique rotation (Promax with Kaiser normalization) was conducted on the twelve items of cognitive presence scale. The overall KMO (.715) and Cronbach's ($\alpha = .814$) were acceptable (Field, 2013). The KMO measure verified the sampling adequacy for the analysis (KMO = .767) on the overall social presence scale as “middling” (Field, 2013, p. 685). All KMO values for individual items were between .631 and .898, which was considered acceptable (Field, 2013). Three factors had eigenvalues over Kaiser's criterion of 1 and in combination explained 65.45% of the variance (see Table E8 in Appendix E). The scree plot was ambiguous (see Figure E9 in Appendix E) and could support retaining either two or eight factors. When examining the initial loading values, items 16 and 21 cross loaded on two factors with almost equal loading values (see Table E3 in Appendix E). I removed items 16 and 21 and reran the principal axis factor analysis, resulting in a three-factor solution with a simple structure (see Table 9).

In Table 9, items clustering around factor 1 reflect how educators perceived students initiated cognitive growth when engaged with various learning activities and named to reflect this perception. Items that clustered around factor 1 represent the initiating subscale of cognitive presence. Items that clustered around factor 2 reflect how educators perceived students integrated knowledge gained from engaging in learning activities. Items clustered around factor 2 represent the integration subscale of cognitive presence. Items that clustered around factor 3 represent how educators perceived students' ability to demonstrate cognitive growth. Items clustered around factor 3 represent the resolution subscale of cognitive presence scale. Even though factor 3 has only two items, both items were retained to create a third subscale. I felt justified in retaining a two-item subscale because Cronbach's alpha value for the two-item subscale ($\alpha = .814$) was above the acceptable .8 level (Field, 2013). After identifying the three cognitive presence subscales, I calculated the mean for each individual subscale and saved the mean score as three new variables. The new variables were used in primary analyses to answer research questions 1a, 1b, and 1c of this study.

Table 9. EFA 3: Cognitive Presence Scale

Pattern Matrix ^a			
Scale Items	Factor		
	Initiating	Integration	Resolution
12. Students felt motivated to explore content related questions.	.898	-.022	.037
11. Students were curious about course activities.	.743	-.115	.157
10. Problems posed increased the students' interest in issues with the course.	.655	.124	.056
14. Brainstorming and finding relevant information helped students resolve content related questions.	.578	-.046	-.218
13. Students utilized a variety of information sources to explore problems posed in this course.	.530	.129	-.095

Table 9. EFA 3: Cognitive Presence Scale

Scale Items	Pattern Matrix ^a		
	Initiating	Integration	Resolution
18. Reflection on course content and discussions helped students understand fundamental concepts in this class.	-.098	.838	.005
15. Online discussions were valuable in helping students appreciate different perspectives.	.025	.739	-.049
17. Learning activities helped students construct explanations/solutions.	.144	.549	.038
20. Students developed solutions to course problems that can be applied in practice.	-.095	-.087	.932
19. Students can describe ways to test and apply the knowledge created in this course.	-.017	.275	.501
Eigenvalues	3.808	1.610	1.168
% Variance	38.801	16.097	11.681
α	.803	.807	.801

Note. $N = 51$. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading above .4 are in bold. Adopted from Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, R., Ice, P., Richardson, J., Shea, P., & Swan, K. (2008). Community of inquiry framework: Validation and instrument development. *The International Review of Research in Open and Distributed Learning*, 9(2), 133–136 (<https://doi.org/10.19173/irrodl.v9i2.573>).
a. Rotation converged in 3 iterations.

In all, the COI scale for this study included two teaching presence subscales (i.e., course structure and facilitation of student discussions), two social presence subscales (i.e., comfort of engagement and establishing group cohesion), and three cognitive presence subscales (i.e., initiating, integration, and resolution). A mean score was calculated for each of the seven subscales and used as dependent variables in primary analyses.

Normality Tests

Continuing with the preliminary analyses, the data from the seven COI subscales, established in preliminary analysis, underwent normality tests. Normality tests were

conducted on each of the subscales to identify the mean scores for each subscale (see Table 10). Table 10 shows the results of the Kolmogorov-Smirnov and Shapiro-Wilk tests. The output from the test shows that all subscales were statistically significant, meaning they are equal to (social presence subscales) or below (teaching and cognitive presence subscales) the statistically significant .05 value. This means that the mean score values for teaching and cognitive presence subscales did not reach normality.

Table 10. Community of Inquiry Scale Test of Normality

Community of Inquiry Subscales	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Social Presence Comfort of Engagement Scale Mean	.137	42	.046	.949	42	.061
Social Presence Establishing Group Cohesion Scale Mean	.135	42	.052	.968	42	.280
Teaching Presence Facilitation of Student Discussions Scale Mean	.148	42	.022	.905	42	.002
Teaching Presence Course Structure Scale Mean	.326	42	.000	.716	42	.000
Cognitive Presence Initiating Scale Mean	.170	42	.004	.960	42	.145
Cognitive Presence Integration Scale Mean	.216	42	.000	.882	42	.000
Cognitive Presence Resolution Scale Mean	.238	42	.000	.881	42	.000

Social presence subscales were close to .05, however, the boxplot shows extreme outliers for the establishing group cohesion subscale and comfort of engagement were skewed (see Figure 2). Figure 2 also shows extreme outliers for all three cognitive presence subscales and the course structure subscale of teaching presence. I did try transforming data and was unable to shift the data enough towards normality, making it

apparent that I needed to use nonparametric testing techniques and analyses to answer my research questions.

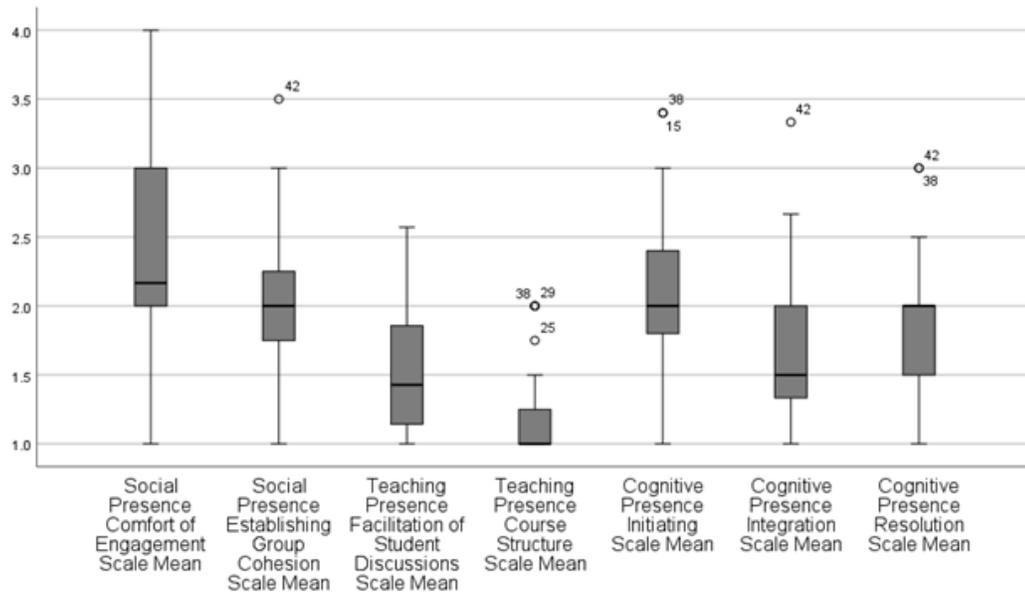


Figure 2. Boxplot: Community of Inquiry Scale

Normality tests showed that data were not normally distributed, and the boxplot supported the inability to get normality due to extreme outliers and skewness. There were extreme outliers and skewed data in each subscale that could not be transformed to normality. Since normality could not be obtained and outliers could not be transformed, nonparametric tests were performed using the mean scores for each of the seven COI subscales.

Results from the preliminary analyses served as independent and dependent variables used in the primary analyses. Data gained during the preliminary descriptive analyses helped identify grouping variables (i.e., independent variables), which included educators' demographics (i.e., years teaching online, age, years teaching developmental education courses), course delivery method (i.e., asynchronous, synchronous, pre-COVID-19, emergency remote, corequisite or not, and postsecondary institution type).

Dependent variables included the seven COI subscale mean scores and the educators' frequency of engagement in student discussions (i.e., fully, partial, and not at all).

Primary Analyses Results

This section presents the results from the primary analyses. Primary analyses were conducted to answer the five research questions and three sub-research questions for this study. Primary analyses included both quantitative analyses (i.e., Mann-Whitney U, Spearman's Rho, Pearson's r, and frequency distributions) and qualitative analysis (open coding analysis). A description of all research questions and analyses are as follows, except for research question 1, which was answered from analyses results of research questions 1a, 1b, and 1c.

Research Question 1

How does the COI framework describe instructor perceptions of online teaching within developmental education courses?

Research question 1 encompasses three sub-research questions. Research questions 1a – 1c used the mean scores of each of the seven COI subscales obtained during preliminary analyses. The mean scores were used as dependent variables. The independent variables (i.e., grouping variables), also obtained from the preliminary analyses, included instructor demographic profile data, and learning environment data. The frequency of engagement in student discussions, data obtained from the Online Instructors Profile questionnaire, were also used in primary analysis.

Because data did not meet parametric assumptions of normality and there were also extreme outliers in the independent variables (i.e., groups) on the dependent variables (i.e., COI subscales), nonparametric analyses (i.e., Mann-Whitney U) were

conducted on data used to answer research questions 1a – 1c. The mean scores, obtained during the preliminary analyses phase for each of the seven COI subscales, underwent nonparametric testing. Mann-Whitney U tests were conducted to produce a mean rank score for each group (i.e., demographics and learning environment) for each subscale. The mean rank scores were compared for statistical differences between groups. The effect sizes were also calculated $r = \frac{z}{\sqrt{N}}$ from the output information produced by the Mann-Whitney U test to determine the effect size of the differences between the independent variables (i.e., groups) on the dependent variables (i.e., seven COI subscales). A discussion on the results of the Mann-Whitney U tests and calculated effect size, for research questions 1a – 1c, are as follows.

Research Question 1a

How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?

The first analysis conducted on data used to answer research question 1a was a Mann-Whitney U test (Field, 2013). Data used to answer research question 1a were derived from the preliminary analyses (i.e., mean scores for each of the seven subscales) and included the three demographic groups (i.e., years teaching online courses, age, and years teaching DE courses). Seven separate Mann-Whitney U tests were conducted on demographic data to produce a mean rank score for each group on each of the seven dependent variables (i.e., subscale mean scores). The test flagged all groups that showed a statistically significant difference (.05 and .01) on the dependent variables. Table 11 shows that the Mann-Whitney U tests flagged some groups as having statistically significant differences. Even though the tests flagged some groups as having statistically

significant differences at a .05 (*) level, I only discuss results on those groups flagged at a .01 level (**). My rationale for using a more conservative significance level when controlling for inflation of Type I errors. Many educators belonged to multiple groups (different than group membership) and their response data were involved in multiple analyses, which increased the chances for a Type I error. The difference between groups and group membership is that many educators can belong to all demographic groups (3 groups) and learning environment (4 groups) but can hold only one membership in that group (i.e., 1 or 0). After controlling for Type I error, no demographic group showed a statistically significant difference at a .01 level. Table 11 shows the results from the Mann-Whitney U test plus the calculated effect sizes for each COI subscale and the individual memberships of the years-teaching online group (independent variables). There were no statistically significant differences between the group membership variables at the .01 level.

Table 11. Demographic: Years Teaching Online Group Test Statistics

Dependent Variables	Independent Variable Group Membership		Test Statistics			
	≤ 2-Years Mean Rank (n)	> 2-Years Mean Rank (n)	U	z	r	p
TP/CS	35.69 (26)	29.41 (37)	385.000	-1.527	.192	.127
TP/FSD	26.19 (21)	25.00 (29)	290.000	-.287	.041	.774
SP/EGC	26.50 (19)	24.89 (31)	275.500	-.384	.054	.701
SP/CE	36.08 (26)	26.24 (34)	297.000	-2.199	.284	.028*
CP/Ini	26.35 (23)	24.78 (27)	291.000	-.385	.055	.700
CP/Int	30.24 (25)	27.10 (31)	344.000	-.735	.098	.462
CP/Res	34.23 (24)	28.01 (36)	342.500	-1.412	.182	.158

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC= social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

Table 12 shows the results from the Mann-Whitney U test plus the calculated effect size for the demographic group – age. There were no statistically significant differences found at the .01 significance level between the group memberships (i.e., fifty-years and over and under fifty-years) on all seven COI scales.

Table 12. Demographic: Age Group Test Statistics

Dependent Variables	Age Group		Test Statistics			
	Independent Variables					
COI Subscales	50-Years and Over	Under 50-Years	<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	Mean Rank	Mean Rank				
	(<i>n</i>)	(<i>n</i>)				
TP/CS	31.48 (29)	32.44 (34)	478.000	-.236	.029	.815
TP/FSD	25.32 (22)	25.64 (28)	304.000	-.079	.011	.937
SP/EGC	25.29 (21)	25.66 (29)	300.000	-.089	.013	.929
SP/CE	32.73 (28)	28.55 (32)	510.500	.943	.122	.345
CP/Ini	28.17 (23)	23.22 (27)	372.000	1.211	.171	.226
CP/Int	27.20 (25)	29.55 (31)	355.000	-.549	.073	.583
CP/Res	31.09 (27)	30.02 (33)	461.500	.248	.032	.804

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC= social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

There were also no statistically significant differences between years teaching DE found at a .01 level (see Table 13). Table 13 shows the results from the Mann-Whitney U test plus the calculated effect size for the two group memberships (i.e., ten-years or less and over ten-years) for the group – years teaching DE courses.

Table 13. Demographic: Years Teaching DE Group Test Statistics

Dependent Variables	Years Teaching Developmental Education Group		Test Statistics			
	Independent Variables					
COI Subscales	Group Membership		<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	10 years & less	Over 10 years				
	Mean Rank	Mean Rank				
	(<i>n</i>)	(<i>n</i>)				
TP/CS	31.74 (35)	33.41 (29)	534.000	.404	.051	.686
TP/FSD	26.03 (30)	25.95 (21)	314.000	-.019	.002	.985

SP/EGC	29.22 (27)	22.38 (24)	237.000	-1.659	.232	.097
SP/CE	33.63 (34)	27.69 (27)	369.500	-1.323	.169	.186
CP/Ini	28.04 (28)	23.52 (23)	265.000	-1.093	.153	.274
CP/Int	29.56 (33)	28.23 (24)	377.500	-.307	.041	.759
CP/Res	31.80 (33)	30.05 (28)	435.500	-.400	.051	.689

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC= social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

The results from the Mann-Whitney U tests showed that there were no statistically significant differences between demographic groups on all seven COI subscales at the .01 level. All groups are close in mean rank values on the dependent variables.

Research Question 1b

How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?

To answer research question 1b, a Mann-Whitney U test was conducted on data (Field, 2013). Data used to answer research question 1b were derived from the preliminary analyses (i.e., mean scores for each of the seven subscales) and included the four learning environment groups (i.e., delivery method, corequisite, COVID-19, and learning institution type). Separate Mann-Whitney U tests were conducted on learning environment data to determine mean rank scores for each group on the seven dependent variables (i.e., COI subscales). Two of the four online learning environment groups showed a significant difference between independent and dependent variables at a .01 level.

Table 14 shows that teaching presence – course structure ($p = .004$), social presence – comfort of engagement ($p = .003$), and cognitive presence – resolution ($p =$

.002) was statistically significant at a .01 level. Instructors who were teaching online courses before the spring 2020 semester or had plans to teach online before that semester (traditional online group), showed lower mean rank scores than those who transferred online during the spring semester of 2020 because of the COVID-19 pandemic (emergency remote). This means that instructors who taught traditional online courses agreed that teaching presence – course structure, social presence – comfort of engagement, and cognitive presence – resolution were more prevalent in their online courses, more than instructors who taught emergency remote courses. However, the effects sizes were small for these differences.

Table 14. Learning Environment: COVID-19 Group Test Statistics

Learning Environment: COVID-19 Group						
Dependent Variables	Independent Variables		Test Statistics			
	Group Membership					
COI Subscales	Traditional Online	Emergency Remote	<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
	Mean Rank (<i>n</i>)	Mean Rank (<i>n</i>)				
TP/CS	25.36 (29)	36.89 (33)	656.500	2.848	.361	.004**
TP/FSD	19.46 (23)	29.90 (26)	426.500	2.570	.367	.010*
SP/EGC	22.52 (25)	27.58 (24)	362.000	1.253	.179	.210
SP/CE	22.56 (26)	35.86 (33)	622.500	3.009	.391	.003**
CP/Ini	20.61 (23)	28.88 (26)	400.000	2.052	.293	.040*
CP/Int	23.19 (26)	32.31 (29)	502.000	2.161	.291	.031*
CP/Res	23.22 (29)	36.55 (30)	631.500	3.110	.405	.002**

Note. ** significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC = social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

There were also statistically significant differences found among members in the course delivery group. Table 15 shows the mean rank value for instructors teaching in an asynchronous learning environment (24.65) as significantly lower than the mean rank score for instructors teaching in synchronous learning environments (37.53) on the social

presence – comfort of engagement scale at the .01 significance level. Instructors teaching in asynchronous learning environments perceived that students were more comfortable with communicating with others in their online courses compared to the perceptions of those instructors’ teaching students in synchronous learning environments. The calculated effect size was small between the two group memberships for the course delivery group.

Table 15. Learning Environment: Course Delivery Group Test Statistics

Dependent Variables	Independent Variables Group Membership		Test Statistics			
	Asynchronous Mean Rank (<i>n</i>)	Synchronous Mean Rank (<i>n</i>)	<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
COI Subscales						
TP/CS	28.89 (32)	36.98 (33)	659.500	1.960	.243	.050*
TP/FSD	24.33 (24)	28.36 (28)	388.000	.962	.133	.336
SP/EGC	25.04 (26)	27.96 (26)	376.000	.702	.097	.482
SP/CE	24.64 (29)	37.53 (33)	677.500	2.858	.362	.004**
CP/Ini	23.73 (24)	28.88 (28)	402.500	1.236	.171	.216
CP/Int	25.57 (27)	32.92 (31)	524.200	1.696	.223	.090
CP/Res	27.06 (31)	35.94 (31)	618.000	2.019	.256	.043*

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC= social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

Based on the results of this analysis, I wanted to explore synchronous and asynchronous delivery methods to see how many participants from the emergency remote group taught synchronous courses. I ran a crosstabulation between the two groups and found that 25 out of 33 participants in the emergency remote group transferred to teaching their students synchronously. I then ran two more crosstabulation analyses on the groups, one on type of professional development training, and the other on years of teaching online courses to see if there were differences between groups on online training and experience. Nineteen participants in the emergency remote group conveyed that they had some training from Quality Matters ($n = 6$) or their institution ($n = 13$), while 12

were learning on the job. Twenty-four participants in the traditional online group also had training from both Quality Matters (n = 12) and training from their institution (n = 12), three participants learned on the job. The crosstabulation for years teaching online and COVID-19 groups, indicated the remote emergency group was divided between one to two -years of experience and over two-years of experience teaching online. Participants in the traditional online group had more participants with over two-years of online experience (n = 20), more than the emergency remote groups (n = 16).

Table 16 shows the Mann-Whitney U tests results and effect sizes for the learning institution groups. No statistically significant differences were found between the learning institution group on the dependent variables at a .01 significance level.

Table 16. Learning Environment: Learning Institution Group Test Statistics

Dependent Variables	Learning Institution Group		Test Statistics			
	Independent Variables		U	z	r	p
	Group Membership					
COI Subscales	2-Year Institution	4-Year Institution				
TP/CS	28.43 (34)	37.12 (30)	648.500	2.109	.264	.035*
TP/FSD	23.19 (26)	28.92 (25)	398.000	1.386	.194	.166
SP/EGC	24.98 (29)	28.41 (23)	377.500	.819	.057	.413
SP/CE	25.97 (32)	36.55 (29)	625.000	2.369	.303	.018*
CP/Ini	24.69 (29)	28.78 (23)	386.000	.980	.136	.327
CP/Int	27.22 (30)	30.98 (27)	458.500	.879	.117	.380
CP/Res	30.45 (33)	32.69 (29)	513.000	.508	.065	.612

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC= social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

Table 17 shows the Mann-Whitney U tests results and effect sizes for the corequisite groups. No statistically significant differences were found between the corequisite groups on the dependent variables at a .01 significance level.

Table 17. Learning Environment: Corequisite Group Test Statistics

Dependent Variables	Corequisite Group		Test Statistics			
	Independent Variables					
COI Subscales	Corequisite Mean Rank (<i>n</i>)	Not Corequisite Mean Rank (<i>n</i>)	<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
TP/CS	34.73 (35)	30.98 (30)	585.500	.905	.112	.366
TP/FSD	28.91 (28)	23.69 (24)	403.500	1.248	.173	.212
SP/EGC	27.17 (29)	25.65 (23)	353.000	.363	.050	.717
SP/CE	31.97 (34)	30.93 (28)	492.000	.230	.029	.818
CP/Ini	26.10 (29)	27.00 (23)	322.000	-.215	.029	.830
CP/Int	28.73 (33)	29.20 (25)	420.000	.121	.016	.904
CP/Res	36.56 (33)	25.74 (29)	645.500	2.458	.312	.014*
FE	30.34 (34)	33.95 (29)	436.500	-.940	.118	.347

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Abbreviations: COI = community of inquiry; TP/CS = teaching presence/course structure; TP/FSLA = teaching presence/facilitation of student discussions; SP/EGC = social presence/establishing group cohesion; SP/CE = social presence/comfort of engagement; CP/Ini = cognitive presence/initiating; CP/Int = cognitive presence integration; CP/Res = cognitive presence/resolution.

The Mann-Whitney U tests and effect sizes showed that there were no statistically significant differences between instructor's demographics but there were significant differences between the online learning environments groups (i.e., course delivery methods, and COVID-19). Significant differences were found between instructors who taught asynchronous and synchronous courses on social presence – comfort of engagement. Significant differences were also found on teaching presence – course structure, social presence – comfort of engagement, and cognitive presence – resolution between instructors who taught traditional online courses and those who taught emergency remote courses.

Research Question 1c

How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?

To answer research question 1c, nonparametric bivariate correlation tests were conducted using Spearman's Rho (Field, 2013). I also conducted parametric testing using Pearson's r as a comparison value. I wanted to see if there were differences between the nonparametric and parametric analyses. Data used in analyses to answer research question 1c was collected from the Online Instructors Profile questionnaire (i.e., frequency of engagement in student online discussions) and the mean scores for each of the seven COI subscales obtained during preliminary analyses. Table 18 shows the correlations between each of the teaching, social, and cognitive presence subscales, and the frequency of engagement in student online discussions. There were no significant relationships between the COI scales and the frequency of engagement in student online discussions. Spearman's rho and Pearson's r were similar in values for each of the COI scales. All scales had a positive relationship except for cognitive presence resolution. Resolution had a negative relationship with frequency of engaging in student online discussions.

Table 18. Correlations: COI Subscales and Engagement in Student Online Discussions

Pedagogical Practices	Statistics	Teaching Presence		Social Presence		Cognitive Presence		
		CS	FSD	CE	EGC	Ini	Int	Res
Frequency of Engaging in Student Online Discussions	Pearson Correlation	.092	.230	.160	.026	.150	.006	-.031
	Sig. (2-tailed)	.527	.109	.269	.860	.299	.968	.833
	Spearman's Rho Correlation Coefficient	.006	.191	.149	.050	.071	.027	-.122

Table 18. Correlations: COI Subscales and Engagement in Student Online Discussions

Sig. (2-tailed)	.964	.183	.302	.731	.623	.854	.397
-----------------	------	------	------	------	------	------	------

Note. Listwise $N = 50$

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Abbreviations: COI = community of inquiry; CS = course structure; FSD = facilitation of student discussions; CE = comfort of engagement; EGC = establishing group cohesion; Ini = initiating; Int = integration; Res = resolution.

There were no statistically significant relationships between the pedagogical practice of engaging in student online discussions and teaching presence, social presence, and cognitive presence subscales.

Research Question 2

What are the differences in levels of engagement in student discussion by demographic group and learning environment?

To answer research question 2, nonparametric (Mann-Whitney U) analyses were conducted on the data (Field, 2013). Data used to answer research question 2 was derived from the preliminary analyses (i.e., mean scores for each of the seven COI subscales) and the frequency of engagement in student online discussions, which was obtained from the Online Instructors Profile questionnaire. Educators were asked to select the best choice out of three choices. Either instructors engaged in student discussions throughout the semester, engaged only at the beginning of the semester, tapering off in the middle of the semester, or they did not engage in student discussions at all. Table 19 shows the results from the Mann-Whitney U tests and the calculated effect sizes. There were no statistically significant differences found between groups for how often instructors engaged in student online discussions.

Table 19. Group Differences on Frequency of Engagement in Student

Independent Variable (Groups)	Group Membership	<i>n</i>	Mean Rank	<i>U</i>	<i>z</i>	<i>r</i>	<i>p</i>
Age	≥ 50 Years	29	29.59	423.000	-.940	.119	.347
	< 50 Years	33	33.18				
Years Teaching Online	≤ 2-Years	25	29.10	522.500	1.034	.131	.301
	> 2-Years	37	33.12				
Corequisite	Corequisite	34	30.34	436.500	-.940	.118	.347
	Not Corequisite	29	33.95				
Learning Institution	2-Year	33	28.85	599.000	1.727	.217	.084
	4-Year	30	35.47				
Course Delivery Method	Asynchronous	32	33.36	452.500	-.722	.090	.471
	Synchronous	31	30.60				
COVID-19	Traditional Online	29	31.17	459.000	-.089	.011	.929
	Emergency Remote	32	30.84				
Years Teaching Developmental Courses	≤ 10 years	34	31.50	510.000	.283	.036	.777
	> 10 years	29	32.59				

Note. ** Significant ($\alpha \leq .01$) and * ($\alpha \leq .05$)

Instructors in all groups had similar mean rank values showing minor difference between how often instructors participated in student online discussions throughout a semester (i.e., fully participated throughout the semester, participated at the beginning than tapered off in the middle of the semester, or they did not participate at all).

Research Question 3

What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?

To answer research question 3, descriptive analyses were conducted on data (Field, 2013). Data used in analyses were derived from participant responses to methods used when communicating course information (e.g., goals, objectives, syllabus, due

dates, etc.), providing feedback, and facilitating student online discussions, which was obtained from the Online Instructors Profile questionnaire. Data also included the seven groups formed in preliminary analyses. Descriptive analyses were conducted separately for methods used when communicating course information, providing feedback to students, and facilitating online student discussions.

Online Methods Used When Communicating Course Information to Students

Instructors used various online methods to communicate information to their students, but some were used more than others. When looking at each group separately, Table 20 shows there were differences between the groups on methods used when communicating course information to students. Video messages and emailing were the top choices for all groups when communicating course information to students. In the demographic groups, instructors who were less than fifty years in age or taught DE courses for ten years or less used virtual meetings more than any other method. Instructors who were fifty years of age or older and instructors who had more than two years of experience teaching online courses used virtual meetings and emails equally, when communicating course information to students.

There were also high percentages of instructors who used course websites and notes on assignments for communicating course information to students. Blogs and social media were the methods least likely used to communicate course information to students. Instructors who were fifty years of age or older, instructors with more than ten years of experience teaching DE, instructors who had two or fewer years of experience teaching online courses, those teaching in a synchronous learning environment, instructors not teaching in a corequisite learning environment, instructors who transferred to online

teaching during the spring semester of 2020 due to COVID-19, and those teaching at a four-year learning institution did not use social media for providing feedback to students. Instructors who were less than fifty-years of age, instructors who had two or fewer years of experience teaching online courses, instructors teaching in synchronous learning environments, and teaching at a four-year learning institution did not use blogs when providing feedback to students in their online courses.

Table 20. Group Percentages: Methods of Communicating Course Information

Group Mem. (n)	Email	Phone	VM	CR	SM	Forum	Blog	CWS	Note	Vid. Msg.
Demographic Groups										
< 50 Age (34)	79.4	29.4	88.2	8.8	2.9	61.8	0.0	67.6	58.8	5.9
≥ 50 Age (29)	93.1	27.6	93.1	10.3	0.0	58.6	6.9	79.3	65.5	13.8
≤ 10 Years DE (35)	80.0	25.7	91.4	14.3	2.9	62.9	2.9	65.7	68.6	11.4
> 10-Years DE (29)	93.1	31.0	89.7	3.4	0.0	55.2	3.4	82.8	55.2	6.9
≤ 2-Years online (26)	80.8	30.8	92.3	3.8	0.0	61.5	0.0	69.2	76.9	15.4
> 2-Years online (37)	89.2	27.0	89.2	13.5	2.7	59.5	5.4	75.7	54.1	5.4
Online Learning Environments										
Async. (32)	90.6	34.4	84.4	3.1	3.1	71.9	6.3	71.9	62.5	12.5
Sync. (33)	78.8	21.2	93.9	15.2	0.0	45.5	0.0	72.7	60.6	6.1
Corequisite (35)	82.9	31.4	85.7	2.9	2.9	54.3	2.9	77.1	62.9	11.4
Not Co-requisite (30)	86.7	23.3	93.3	16.7	0.0	63.3	3.3	66.7	60.0	6.7
Traditional Online (29)	96.6	37.9	96.6	6.9	3.4	69.0	3.4	65.5	65.5	10.3
Emergency Remote (33)	75.8	18.2	87.9	12.1	0.0	48.5	3.0	78.8	57.6	6.1
2-Year LI (34)	82.4	20.6	85.3	8.8	2.9	64.7	5.9	70.6	55.9	11.8
4-Year LI (30)	66.7	36.7	93.3	10.0	0.0	50.0	0.0	76.7	70.0	6.7
Abbreviations. DE = developmental education; Async. = Asynchronous; Sync. = Synchronous; LI = learning institution; GRP = Group; Mem. = Membership; Dem = demographic groups; OLE = online learning environment groups; CWS = course website; Mess. = message; VM = video meetings; CR = chat room; SM = social media; Note = notes on assignments; Vid. Msg. = video message.										

Online Communication Methods Used When Providing Feedback to Students

Instructors used a variety of online methods to provide feedback to their students, but some methods were used more than other methods. Table 22 shows that virtual meetings and emails were the most used methods for providing students with feedback in their online courses. Looking at both the demographic and online learning environment groups, instructors who were fifty years or older, instructors who taught DE courses for more than ten years, and instructors who taught at either a two-year or four-year learning institution used both emails and virtual meetings equally. Instructors who taught in an asynchronous online learning environment used emails over virtual meetings but used virtual meetings and notes on assignments equally. There was also a high percentage of instructors who used notes on assignments and course websites when providing feedback to students. The instructors who had ten or fewer years of experience teaching DE, and instructors with two or fewer years of experience teaching online courses used forums more than websites and notes on assignments. Table 21 also showed the least likely method for providing feedback to students (i.e., social media, blogs, and video meetings). All instructors who were fifty years of age or older, who had over ten years of experience teaching DE courses, instructors with two or fewer years in online teaching experience, instructors teaching asynchronous courses, and instructors who taught at a four-year learning institution did not use social media for providing students with feedback. All groups, except for instructors with two-years or fewer in online teaching experience, instructors who taught in a corequisite learning environment, and instructors who taught at a four-year learning institution did not use blogs when providing feedback to students in their online courses. Finally, instructors who taught synchronous courses did not use video meetings when providing feedback to students.

Table 21. Group Percentage: Methods Used When Providing Student Feedback

Group Mem. (n)	Email	Phone	VM	CR	SM	Forum	Blog	CWS	Note	Vid. Msg.
Demographic Groups										
< 50 Age (34)	70.6	32.4	73.5	14.7	5.9	47.1	2.9	47.1	61.8	5.9
≥ 50 Age (29)	82.8	20.7	82.8	13.8	0.0	65.5	3.4	79.3	79.3	6.9
≤ 10 Years DE (35)	71.4	20.0	74.3	20.0	5.7	65.7	2.9	60.0	62.9	2.9
> 10-Years DE (29)	82.8	37.9	82.8	6.9	0.0	44.8	3.4	65.5	79.3	10.3
≤ 2-Years online (26)	65.4	26.9	84.6	11.5	0.0	57.7	0.0	53.8	57.7	3.8
> 2-Years online (37)	83.8	27.0	73.0	16.2	2.7	54.1	5.4	67.6	78.4	8.1
Online Learning Environments										
Async. (32)	75.0	31.3	71.9	6.3	0.0	56.3	3.1	59.4	71.9	12.50
Sync. (33)	75.8	24.2	81.8	21.2	6.1	54.5	3.0	63.6	66.7	0.0
Corequisite (35)	65.7	25.7	71.4	11.4	2.9	57.1	0.0	65.7	65.7	5.7
Not Co-requisite (30)	86.7	30.0	83.3	16.7	3.3	53.3	6.7	56.7	73.3	6.7
Traditional Online (29)	89.7	37.9	82.8	13.8	3.4	58.6	6.9	62.1	72.4	10.3
Emergency Remote (33)	69.7	21.2	78.8	15.2	3.0	54.5	0.0	66.7	66.7	3.0
2-Year LI (34)	76.5	23.5	76.5	20.6	5.9	55.9	5.9	73.5	67.6	8.8
4-Year LI (30)	76.7	33.3	76.7	6.7	0.0	53.3	0.0	50.0	73.3	3.3
Abbreviations. DE = developmental education; Async. = Asynchronous; Sync. = Synchronous; LI = learning institution; GRP = Group; Mem. = Membership; Dem = demographic groups; OLE = online learning environment groups; CWS = course website; Mess. = message; VM = video meetings; CR = chat room; SM = social media; Note = notes on assignments; Vid. Msg. = video message.										

Online Methods Used to Engage Students in Discussions

Instructors used various methods to engage students in online discussions (see Table 22). Forums were used by most instructors as a method to engage students in discussions. Instructors who were fifty years of age or over, instructors with two or fewer years of experience teaching online, and instructors who taught synchronous courses used virtual meetings over forums. Video messages, social media, and blogs were the least popular method used to engage students in online classroom discussions. Only instructors who taught at a four-year learning institution used video messages to engage students in discussions; all other instructors did not use video messages as a method to engage students in discussions. Instructors who were fifty years or more in age, instructors with over ten years of experience teaching DE courses, instructors with two or fewer years of experience teaching online courses, instructors who transferred to online courses during the spring semester of 2020 due to the COVID-19 (emergency remote), and instructors who taught at a four-year learning institution did not use social media to engage students in classroom discussions.

Table 22. Group Percentage: Methods Used When Engaged in Student Discussions

Group Mem. (n)	Email	Phone	VM	CR	SM	Forum	Blog	CWS	Note	Vid. Msg.
Demographic Groups										
< 50 Age (34)	32.4	17.6	64.7	20.6	5.9	82.4	5.9	35.3	23.5	0.0
≥ 50 Age (29)	27.6	3.4	82.8	20.7	0.0	75.9	6.9	48.3	17.2	0.0
≤ 10 Years DE (35)	20.0	8.6	71.4	17.1	5.7	77.1	8.6	34.3	22.9	0.0
> 10-Years DE (29)	41.4	13.8	75.9	24.1	0.0	82.8	3.4	48.3	17.2	0.0
≤ 2-Years online (26)	26.9	3.8	80.8	15.4	0.0	76.9	3.8	42.3	23.1	0.0
> 2-Years online (37)	32.4	16.2	67.6	24.3	5.4	81.1	8.1	40.5	18.9	0.0
Online Learning Environments										
Async. (32)	31.3	15.6	53.1	18.8	3.1	87.5	9.4	37.5	18.8	0.0
Sync. (33)	27.3	6.1	90.9	21.2	3.0	69.7	3.0	42.4	21.2	0.0
Corequisite (35)	22.9	5.7	71.4	17.1	3.3	77.1	5.7	37.1	17.1	0.0
Not Co-requisite (30)	36.7	16.7	73.3	23.3	2.9	80.0	6.7	43.3	23.3	0.0

Table 22. Group Percentage: Methods Used When Engaged in Student Discussions

Group Mem. (n)	Email	Phone	VM	CR	SM	Forum	Blog	CWS	Note	Vid. Msg.
Traditional Online (29)	41.4	13.8	69.0	24.1	6.9	86.2	6.9	41.4	24.1	0.0
Emergency Remote (33)	18.2	9.1	78.8	18.2	0.0	72.7	6.1	39.4	15.2	0.0
2-Year LI (34)	20.6	8.8	70.6	26.5	5.9	79.4	8.8	44.1	20.6	0.0
4-Year LI (30)	40.0	13.3	73.3	13.3	0.0	76.7	3.3	36.7	20.0	3.3

Abbreviations. DE = developmental education; Async. = Asynchronous; Sync. = Synchronous; LI = learning institution; GRP = Group; Mem. = Membership; Dem = demographic groups; OLE = online learning environment groups; CWS = course website; Mess. = message; VM = video meetings; CR = chat room; SM = social media; Note. = notes on assignments; Vid. Msg. = video message.

Online instructors used various methods to communicate information, provide feedback, and engage students in online classroom discussions. The most popular methods used by online instructors to communicate course information and provide feedback to students in their online courses included virtual meetings and emails. This was not the case for engaging students in online classroom discussions; most instructors used forums as a method for engaging students in discussions. Blogs and social media were the least popular methods used by most online instructors when communicating course information, providing feedback, and engaging students in online classroom discussions.

Research Question 4

What successes and challenges do online developmental educators encounter in their online courses?

To answer research question 4, an open coding analysis was conducted (Saldaña, 2016). Data used in the analysis were derived from participant response data to the following statement: “Please share some of the successes and or challenges of communicating with online students using online methods.” Sixty-three educators provided responses, however, only fifty-one responses were used in the open coding

analysis. Response data from twelve participants were labeled as vague and offered little information towards answering the research question. For example, vague responses included remarks such as, “I teach a support section of a regularly required composition class.,” “I find engaging students in corequisite courses difficult,” “[h]ybrid classes do not work,” and “[g]etting consistent connection with the lower skilled and/or less college-aware students can be difficult.” Vague responses were not used in the open coding analysis. Data from the remaining fifty-one participant responses underwent open coding analysis (Saldaña, 2016). First, response data were explored for categorized groupings that aligned with the COI framework (i.e., social presence, teaching presence, and cognitive presence). However, upon closer examination of data, another approach was needed to better describe the successes and challenges of teaching and learning in postsecondary DE online courses. A more in-depth open coding analysis that expanded beyond the a-priori categories was conducted on data. The open coding analyses revealed three major categorized groupings, student engagement with course resources, student participation in discussions, and creating relationships and a sense of community, which better described the challenges and successes of teaching and learning in online learning environments. Each categorized grouping is discussed separately.

Categorized Grouping 1. Student Engagement with Course Resources

Instructors utilized the learning management system tools (i.e., email, announcements, text, and chatrooms) and synchronous class sessions to provide students with direct instruction, course materials, resources, and feedback. Instructors expected students to actively engage (i.e., attend, access, read, watch, or listen) with course resources regularly. Table 23 shows that twenty-one instructors found that getting

students to engage with course resources regularly was challenging, while fifteen instructors felt successful at getting them to engage with course resources regularly.

Table 23. Student Engagement with Course Resources

Description	Instructors used various methods (i.e., emails, announcements, text, discussions post, instructional videos, synchronous lectures, recorded lectures, and office hours) when providing students with course information, direct instruction, and engaging students in the learning process. Instructors reported challenges and successful practices used to help students engage with course resources.
Occurrences	Category
	<u>Challenges</u>
<i>n</i> = 12	<ul style="list-style-type: none"> • LMS-Asynchronous Methods (Email/Recorded Instructions/Posted Text/Announcements/Messages)
<i>n</i> = 9	<ul style="list-style-type: none"> • Synchronous Methods (In-Class Instructions and Office Hours/Scheduled Meetings)
	<u>Successes</u>
<i>n</i> = 6	<ul style="list-style-type: none"> • LMS-Asynchronous Methods (Email/Recorded Instructions/Posted Text/Announcements/Messages)
<i>n</i> = 6	<ul style="list-style-type: none"> • Interactive Online Programs (Turnitin, PeerMark, Interactive Power Point, Playposit Quizzes, games)
<i>n</i> = 4	<ul style="list-style-type: none"> • Synchronous Methods (In-Class Instruction and Office Hours/Scheduled Meetings)

Instructors who reported challenges in getting students to engage with course resources stated that students were not accessing course materials, reading emails, text, announcements, posted instructions, or feedback on a regular basis, which had an impact on student success. For example, one instructor wrote, “[s]tudents do not check their email regularly, which makes following directions difficult. Often I receive emails with questions to which I had already provided an answer.” Another example included by an instructor included, “the biggest challenge is that student[s] are not reading course material, either assignment instructions, the syllabus, or course annou[n]cements. Few of them watch the provided videos that explain concepts and assignments.”

Instructors reported that students were not reading course materials but questioned if they were listening to instruction provided by the instructor either via instructional

videos or during synchronous courses. For example, one instructor wrote, “[s]tudents do not read the instructions posted. So, in an effort to reach them in a different way, I record the instructions as well. I have also learned students do not listen or know how to listen.” An example provided by an instructor teaching synchronous courses provided, “[i]t’s a challenge when students log in but then turn in to ghosts - no reply, not a peep during class. I wonder if they are even there!”

Instructors felt that a student’s choice to engage with course materials, instructor correspondence, or instruction impacted student success in the course. For example, one instructor stated, “[e]mail can be incredibly hit or miss ... If a student doesn’t respond to my communications, however, it becomes essentially impossible to hold them accountable save for negative grades” A second example provided by an instructor included, “[t]he major problem is students logging in, not turning on the camera and ‘disappearing’. Those who stay and participate achieve the goals and usually pass. The students who do not engage with others or with the instructor usually fail.” A final example provided by an instructor on student success included “[s]tudents who attend Zoom class, cameras on, and interact benefit. The students who sign in and [I] have no idea if they are mon[i]toring the course tend not to do well. I can call on them and they do not respond, or the class session ends and they don’t sign off.”

Several instructors recognized that the methods they were using to communicate course information to students may be the reason students were not engaging. Instructors started using different methods to engage students with the course materials, resources, and feedback. For example, one instructor wrote, “[s]ome students respond positively and proactively to announcements. Others less so. Similarly for annotated and summative

feedback in grading. I've started asking students to reflect upon the feedback in order to force them to look at it." Another example provided by an instructor included, "I have found that sending messages through Canvas seems to get a quicker response from students than using the college email system. I also use the Remind texting service to contact students." Other examples included instructors taking a more direct approach of communicating course materials to students, making sure that students were accessing and understanding the materials, requiring students to schedule personal meetings with the instructors, or work in groups. For example, one instructor wrote, "I have set-up Zoom office hours to help students work through their struggles and frustrations. This has improved their learning and engagement in the course." Another example provided by an instructor included, "[m]y most successful practice in online teaching has probably been required small group and individual check-ins (via Teams or Zoom) with me at key points in the semester. These virtual office hours helped clarify concepts that are challenging to grapple in an asynchronous course."

Overall, instructors felt challenged in getting students to engage with the course materials and resources and found that students who did not engage with the course materials, read, or listen to instruction, or acknowledge instructor communications and feedback were less likely to succeed in the online courses. To help students succeed, instructors utilized different methods of providing students with the course information, which included methods that required students to acknowledge that they understood the information about the course. Instructors found that some methods were more successful in getting students to engage with the course materials and resources, while other methods were less successful.

Categorized Grouping 2: Student Participation in Discussions

Instructors used asynchronous and synchronous discussions as a teaching tool to help students learn and observe student knowledge and understanding. Instructors designed discussions to engage students in meaningful dialogue which fosters student learning and the creation of knowledge. Many instructors designed their online discussions to be student led learning activities, meaning they wanted students to lead the discussions. Instructors served as discussion facilitators and monitors, only intervening in discussions when students needed clarification or guidance. However, some instructors found that students were not participating in discussions as intended, while others showed some success in getting students to participate in discussions as intended. Table 24 shows that seventeen instructors found students were not participating in online discussions as intended, while four instructors showed success in getting students to participate in discussions as intended.

Table 24. Student Engagement in Meaningful Discussions

Description	Asynchronous and synchronous discussions were used by instructors as a tool to help students create meaning and engage students in the learning process. Instructors reported challenges and successes of using online discussions and getting students to engage in meaningful discussions.
Occurrences	Category
	<u>Challenges</u>
$n = 17$	<ul style="list-style-type: none">• Getting students to engage in discussions
	<u>Successes</u>
$n = 2$	<ul style="list-style-type: none">• Instructors participated in discussions with students
$n = 1$	<ul style="list-style-type: none">• Instructors required students to work in groups
$n = 1$	<ul style="list-style-type: none">• Breaking asynchronous post into smaller chunks and assigning separate deadlines

Instructors in synchronous courses perceived that student-led discussions were a challenge. Instructors teaching synchronous courses tried to get students to participate in student-led discussions during class sessions and conveyed that they had to change their

approach so discussions if discussions were to take place. For example, one instructor wrote, “[i]t is difficult to get students to participate online, so I end up doing the majority of the talking--which I hate to do. I prefer discussion and interactive classes. I ask questions throughout class, attempting to solicit discussion and participation. I generally have 3 or 4 students in our small classes of less [than]15 who will engage with me.”

Instructors conveyed a perception that students were not participating in synchronous class discussions because they were uncomfortable speaking in front of others. Instructors found that unless students were called upon by the instructor to speak, or the student’s personality was one that naturally felt comfortable speaking in front of others, students did not participate voluntarily in discussions. For example, one instructor wrote, “[students] are often shy and hesitant about engaging in person; well, this hesitancy is enhanced when the class goes online. Students would much rather blend in than stand out in a new class, but the online environment, by necessity highlights the speaker, so students will do everything possible to not draw attention, such as keeping mics and videos off and not speaking unless specifically called upon to speak.” Student disengagement in online synchronous discussions was further supported by another instructor who wrote, “[students] don't tend to speak up as much ... Those online tend to be very quiet unless their personality is one that is always outgoing and talkative.”

To get students to participate in discussions some instructors tried breaking students into small groups. Instead of requiring large class discussion, instructors would assign small groups to breakout rooms for small group discussions; however, this approach also proved a challenge. Instructors found that students were not talking to each other in these breakout rooms and had to intervene and change the approach to get

students to engage. For example, one instructor wrote that “breakout rooms [were] black holes for disengaged students.” Meaning, when students were left alone to lead discussions in their small groups, they were not participating in the discussions as intended. This notion was further supported by one instructor who wrote, “I am always trying to come up with ways to keep students engaged- sometimes an activity I planned is not having the expected results, so I have to come up with something else on the spot or I jump into a room to check on group work and notice everyone is silent doing their own thing, so I have to change the rules for that group.”

Instructors teaching asynchronous courses found students were participating in student-led discussions; however, student discussions lacked deep thinking and meaning making conversations. For example, one instructor wrote, “[s]tudents do engage with one another in the forums, but it is difficult to have any truly meaningful discussions to happen because students really are predisposed to agree with one another. I don't think it is an issue of not *wanting* to disagree with one another. It seems more like students are just wanting to ensure they are being nice to one another and not discourage anyone from speaking. Even when they disagree, they will end statements with "but what you said is great and probably true too!" Another example provided by an instructor included, “[m]any times [students] will post something and students who disagree normally do not respond to the post they disagree on.”

Another challenge that instructors reported about asynchronous discussions included students' reluctance to participate in discussions. Instructors reported that students were reluctant to participate in discussions because they were uncomfortable sharing their writing. Asynchronous discussions required students to openly demonstrate

their writing abilities. Some students were not comfortable sharing their writing, especially students in developmental writing courses. For example, one instructor wrote, “[i]n my experience, dev writing students are uncomfortable in letting others seeing their writing, so many did not want to participate in discussion topics.”

Many instructors found getting students to engage in meaningful discussions a challenge, however some instructors found success in getting students to engage in meaningful discussion when they changed their teaching approach. One instructor wrote “[a] challenge is getting participation. For example, discussions facilitate conversation and yet most students don't respond to discussions till the due date, leaving little time for interaction and commentary. Breaking up a discussion [making] post 1 due on day 3 and post 2 due [on] day 5 helps.” Some instructors showed success when requiring students to create their own meaning before engaging in discussions with others. For example, one instructor relayed “[o]ne of the most successful things that I have done with my online course (and my courses in general) is to institute weekly meaning making statement opportunities.... In essence, they have to start each discussion post ... [by] answering a question that asks them to generate their own meaning for the material.” Other instructors had success getting students to engage in meaningful discussions when they engaged in the discussion with their students. For example, one instructor wrote, “[i]t was great success for me to interact with a post to help bring clarity to the student and their fellow students.”

Instructors used discussions to assist students in creating meaning, build knowledge, and help with understanding open coding, however, many instructors reported that students were not participating in discussions as intended. Instructors

teaching synchronous courses found that students were not engaging in student led discussions when left alone and reported that many students would only participate when the instructor would call on them to speak. Instructors who taught asynchronous discussions found that students were reluctant to engage when discussions required students to disagree with other students or show their writing openly. Several instructors changed their approach to help students create knowledge and engage in meaning making discussions by staggering post deadline, promoting a more in-depth conversation between students and at times intervening in student discussions to clarify misunderstanding. Other instructors showed success in helping students create meaning when they required students to create their own meaning before engaging in discussions with others or require students to create meaning as a group.

Categorized Grouping 3: Creating Relationships, Community, and a Sense of Belonging

Online learning environments can be isolating for students and instructors, with limited opportunities for building personal relationships, creating impressions of course participants as ‘real people,’ and or building a sense of community. Table 25 shows that seven instructors conveyed that it was a challenge when trying to build personal relationships, community, and a sense of belonging among students, while four instructors conveyed success in building relationships, community, and a sense of belonging among course participants.

Table 25. Creating Relationships and Sense of Community

Description	Challenges and successes reported by instructors when establishing relationships, community, and a sense of belonging with and among students within online learning environments.
Occurrences	Category
	<u>Challenges</u>

Table 25. Creating Relationships and Sense of Community

<i>n</i> = 7	Building Relationships, Community, and a Sense of Belonging <u>Successes</u>
<i>n</i> = 2	Introduction Activities (i.e., ice breaker activities and personalizing accounts, student video presentations, require small group collaboration, and personal instructor videos)
<i>n</i> = 2	Grouping Students Together

Instructors found that building relationships, community, or a sense of belonging was difficult to do in asynchronous courses because asynchronous courses lack the ability to see or hear students. For example, one instructor wrote “[t]he developmental course that I teach do not include any sort of synchronous discussion or interaction between students. This limits the sense of community and camaraderie that can exist in a normal F2F class.” Another instructor wrote “[n]ot seeing faces or hearing voices, i.e., communicating primarily through [text], feels awkward and impersonal.”

A few instructors teaching asynchronous courses recognized that their students missed the interactions of others in their online courses. For example, one instructor perceived that “[online environments] lack ... social interaction that students thrive on.” Many instructors recognized the lack of social interaction between course participants and tried different methods to encourage community and relationship building in asynchronous courses with the synchronous meetings, however some instructors were more successful than others at getting students to attend the synchronous sessions. For example, one instructor who planned in-person social events, found it was a challenge to get students to attend the events. This instructor wrote, “[s]tudents often lament not being able to have opportunities to engage with other students ... however—this is difficult [to do] asynchronously.... I attempt to have meet and greets through the semester, but it is nearly impossible to get more than 2 or 3 students at any given suggested time (as

everyone's schedules are drastically different).” Other instructors were more successful at community and relationship building in their asynchronous courses when they used synchronous online meetings as well as requiring students to personalize their student accounts and create personal videos. For example, one instructor wrote, “[u]sing Zoom to provide moments of synchronous learning is beneficial to students and helps to break the ice. Requiring students to personalize their account (adding a profile pic) allows for a greater sense of community.... Having students share examples and bring personal experiences into the classroom. I had students record their voices on presentations then share it. This added a layer of community.” Another instructor had success when requiring students to work in groups. For example, one instructor conveyed, “[I] group the students into small groups to engage in the learning process together. This helps them have a sense of belongingness within a totally asynchronous course.”

Instructors teaching synchronous courses found that the synchronous environments were more successful at building community and relationships than asynchronous learning environments. For example, one instructor wrote, “I have had the most success with synchronous online courses. I've found synchronous online teaching allows me to create a positive virtual classroom and answer questions in real time. Students make connections with classmates and produce collaborative projects, much better than they do in a purely [asynchronous] online class.”

Some instructors recognized that it was a challenge to create a sense of community in their online courses and found it easier to build personal relationships with individual students. For example, one instructor wrote, “[i]n general, it is more difficult to develop a sense of community among students, although I am successful at developing

relationships with individual students.” Another example of an instructor who reported that building individual relationships were easier than community was provided by one instructor who wrote, “[f]or me, one of the best compliments I can receive from student evaluations is that my students felt like “they were in a real class.” By this they mean, [students] felt like they got to know me and some of the other students. Developing instructor and social presence is something I believe is important if we are going to reach our online students.”

Instructors teaching asynchronous courses found that their online learning environments lacked social interactions and tried different methods to encourage community and relationship building among course participants. A few instructors reported that they had success with synchronous meetings, requiring students to personalize student accounts, and create video presentations. Instructors also recognized that creating relationships with and among students was easier than creating a sense of community in their online learning environments.

Teaching online can be challenging, especially when students are not engaging with course resources, participating in discussions as intended, or lack social interactions needed to build relationships and community. Online learning environments where students were not engaging with course resources, participating in meaningful discussions, or lacked social interactions created a challenge for online teachers and had a negative influence on student success. Online course environments where students engaged with course resources on a regular basis, contributed towards meaningful discussions, and had opportunities for students to depict themselves as “real people” proved to be more successful learning environments.

Research Question 5

How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?

To answer research question 5, I conducted an open coding analysis on instructor response data. Instructors were asked to briefly describe how COVID-19 affected their views on teaching and student learning in DE. Sixty-two instructors responded to the question, however, only forty-seven responses were used in the open coding analysis. Data from fifteen responses were vague. Vague responses were not used in analysis. Examples of vague responses included “in-person instruction is advantageous for developmental education,” “it has hindered Developmental students,” “online school doesn't work,” and “the pandemic has reinforced the importance of in-person learning.” Data from the remaining forty-seven responses underwent open coding analysis. Four categorized groupings emerged from the open coding analysis (Table 26). Table 27 shows the four categorized groupings that emerged from data, which identified the most prominent effects that COVID-19 had on teaching and learning. Each categorized grouping is discussed separately.

Table 26. Effects of COVID-19: Categorized Groupings and Descriptions

Description	Indicators	Occurrences
Category 1: Changes in Teacher Pedagogy COVID-19 and the transition to online course delivery impacted instructors. Instructors changed their teaching practices and beliefs of online teaching. Instructors described how they adjusted and changed in their beliefs and practices to meet the needs of their students.	• Change in Teaching Practices	11
	• No Change in Teaching Practices	2
	• Change in Beliefs	8
Category 2: Effects on Student Learning Due to COVID-19 courses were transferred online. Instructors give their experiences of the transitions and their effects on students. Instructors described the observed differences in students' behaviors due to the online transition.	• Preparedness	6
	• Attitude, Motivation, Anxiety	6
	• Life Influences	6
	• Positive Outcome	2
Category 3: Comparison Between Online and In-Person Learning Environments Instructors report the differences between in-person and online teaching and learning when looking at student success.	• Student Success	10
	• Access to Education	6
	• Interactions Between Course Participants	4
Category 4: Recommendations for Educators Teaching Developmental Education Instructors made recommendations for the design of future online developmental education online courses, which may enhance student learning. Enhancements included teaching practices, training, and creating a contingency plan.	• Teaching Practices	8
	• Mandatory Training	2
	• Contingency Plan	1

Categorized Grouping 1: Changes in Teaching Pedagogies

COVID-19 had an impact on many instructors, especially instructors who had to transfer from in-person courses to online courses. Table 26 shows that eleven instructors changed their teaching practices, eight instructors changed their beliefs of teaching online, and two instructors indicated that COVID-19 had no impact on their teaching or beliefs of teaching online. Instructors who indicated a change in their teaching practices reported that the teaching practices which they used in an in-person course was not as effective in an online course. For example, one instructor wrote, “I have moved to very

flexible assignment due dates. I have also moved to ungrading techniques.” A second instructor wrote, “I’ve offered my students more empathy. If an assignment is late, if they are sick, if anything is going on, I’m not as hard on them as I once was. I don’t let them slack completely, but everyone has been affected in many ways, so I’m sensitive to that when they turn in assignments.” A third instructor wrote, “It has made me incredibly skeptical of many of our current learning practices, both online and in-person. Our need to cling to deadlines, and to classroom control in general, does not reflect the reality of our students’ learning.”

Instructors who indicated a change in their beliefs reported their experience from the transfer made them question the way they were teaching. For example, one instructor wrote, “[i]t has made me incredibly skeptical of many of our current learning practices, both online and in-person. Our need to cling to deadlines, and to classroom control in general, does not reflect the reality of our students’ learning.” Another instructor wrote, “the pandemic made me more determined to address the needs of students in developmental education in any and all available formats. I used to think that the best and only acceptable way to teach students in developmental education was in-person, but I see now that the more options available to students, the more possibility there is that they will choose a delivery method that works for their learning and goals.” A final example of a change in belief included, “For me, online education has always been a great way for students who struggle with time, distance, and other barriers to obtain their education. Prior to the pandemic I felt as if online teaching was seen as not as good as in person teaching. During the pandemic, I have seen a lot of faculty change their perceptions regarding online courses. For example, in the past it was thought by some faculty that

teaching online was “easy.” Some of those faculty learned that it is indeed not if you are trying to do it well. At my institution we got to a place in which some faculty were begging to go back into the classroom since teaching online was so time consuming. . . . I have always held the view that online education is great and the pandemic seems to have accelerated the rate in which online teaching and education is accepted. I am excited for the future of online learning.”

The two instructors, who indicated that the transfer had no effect on how they taught or on their beliefs of teaching, reported that they used the same methods prior to the transfer, so there was no change needed. For example, one instructor wrote, “[s]ome people believe teaching in an online learning environment is totally different than in a traditional classroom setting; however, I do the same teaching methods, styles, and strategies with modification depending on which learning environment the class is being held in.” The second instructor wrote, “I use technology in teaching and learning all the time and the pandemic didn't affect my teaching style.”

Even though a few instructors indicated that the transfer to online had no effect on how they taught or what they believed about teaching online, many instructors did change how they perceived teaching and learning, and a change was needed to meet the needs of their students. Some instructors questioned the effectiveness of their teaching methods, finding that in-person teaching methods were not effective for online learning, while others questioned their teaching practices in general. Also, some instructors realized they held a misconception about online teaching and learning, which led to some instructors questioning their beliefs and effectiveness of how they were teaching in both in-person and online courses.

Categorized Grouping 2: Effects on Student Learning

Instructors observed how COVID-19 and the transfer from in-person to online learning affected their students. Table 26 shows that twenty instructors indicated the transfer impacted student learning. Six instructors reported that their students were underprepared for online learning; six instructors reported that their students struggled with anxiety, motivation, and attitudes towards learning; six instructors reported that students had life issues, which effected student learning; and two instructors reported that despite the student's situation students were resilient and excelled at online learning.

Instructors who noticed a difference between student outcomes post COVID-19 compared to pre-COVID-19, indicated that student outcomes were more positive pre-COVID-19; after the transfer students struggled to keep up and succeed. For example, one instructor wrote, “[p]rior to Covid, students who self-selected online courses, in general, were prepared and ready for the online environment. ... After Covid, I met a lot of resistance with students to the online environment.” A second example included “[s]tudents who choose to do online classes usually understand the expectations of the online course environment. Students who got forced into online courses due to the pandemic were not all aware of what an online course demands.” A final example of students who struggled with the transfer was provided by an instructor who wrote, “[t]hese students are especially confused in their online courses, which often requires students to have strong self-management skills along with strong academic skills ... characteristics developing students have not yet mastered. Students report feeling detached from their professor, the other students, and the content. At times online education is ripe for cheating, and desperate, struggling students may be more apt to go

down that avenue [instead of] doing the work.” Instructors felt the transfer influenced student outcomes. Instructors felt that students who struggled were underprepared for the rigors of online learning or lacked self-regulation skills needed to succeed in online courses.

Instructors also reported that they noticed a change in their students’ attitudes, motivation, and anxiety after the transfer to online courses. For example, one instructor wrote, “[s]tudents in DE are typically not the best candidates for online education. Their motivation drops and they give up. ... one of my students dropped out of college and said she is just not college material.” A second instructor wrote, “[i]t is clear that students expectations of online learning has changed since COVID-19. They expect it to be more personal and interactive. However, they seem to also expect to give it less effort and engagement.” A third instructor wrote, “[s]tudents are struggling with social anxiety to go back to the classroom but an overwhelming amount are ready for a normal again.” Instructors felt students struggled with motivation and anxiety and changed their attitudes towards learning, which influenced students' success in the course.

Finally, instructors reported that students were affected by life issues, which had an impact on student learning. For example, one instructor wrote, “[s]tudents also seem much more involved with life outside of the classroom - family and work. Missing class for work is more prevalent and the attitude seems to be that it should be excused.” Another second instructor wrote, “I think that COVID exposed many of the affective learning needs of students. It gave me insight to the food, housing, technology, etc struggles that students experience every day.” A final example of student life struggles during COVID-19, which influenced student success, provided by an instructor included,

“[t]he pandemic has made it more difficult for students with challenges (socioeconomic, personal) to keep up. Their needs are more pronounced. Mental health and struggles with work are more pronounced.” COVID-19 and the transfer to online learning brought to light the everyday struggles that students faced while going to college.

COVID-19 and the transfer also brought to light a more personal aspect of students and their life struggles outside of the classroom, however, some students persevered and were resilient. For example, two instructors reported positive change in their students. One instructor wrote, “[b]ecause I had my students submit weekly journal entries, I learned a great deal about the difficulties they were experiencing during the pandemic and this past spring during “Snowmageddon.” I had students who lost family members to Covid; students holed up in their apartments with little contact with their families; many students who lost their jobs--they amazed me with their resilience and determination to continue with their schooling.” The second instructor wrote, “I have had a lot of students mention to me that they enjoy online learning and never would have thought about giving it a chance prior to the pandemic. Now, students seem more open to it and they are more willing to try it.” Despite the struggles brought on by COVID-19 and the transfer to online learning some students excelled in their learning.

Many instructors reported that their students struggled to adjust to academic and home life during COVID-19, which affected their success in learning. However, a few instructors noticed that some students adapted to online learning and were resilient in accomplishing their goals, despite the struggles they endured during COVID-19 and the transfer to online learning.

Categorized Grouping 3: Comparison of Online and In-Person Courses

Many instructors compared online teaching and learning to in-person teaching and learning. Table 26 shows that 20 instructors reported their perceptions on the differences between the two course delivery modes. Instructors reported positive and negative aspects between in-person and online learning environments in DE. Negative aspects included instructors who believed DE online courses were not as effective as in-person courses. Instructors reported that online courses required students to have self-regulation skills and felt many students were still developing those skills and some students may need extra support to be successful in the online courses (i.e., instructor interactions on a regular basis), which may be missing in some online courses. For example, one instructor wrote that “[m]oving classes to an online format made our DFW rates [rise]. Online courses are not typically meant to be taken by DE students as most of them are still learning how to be self-disciplined and still learning how to manage their time.” A second instructor wrote, “I can say teaching in class and online are similar in many ways but students in developmental courses tend to benefit more from classes taught in person.” A third instructor wrote, “I believe that developmental students fare better in the classroom than online. The ability for me as a math teacher to look over a student's shoulder and give them immediate feedback is priceless. I just can't do that online.” A fourth instructor wrote, “I think teaching over zoom is effective; however, students miss out on the opportunity to engage and meet other students as they normally would in a regular classroom setting.” A final example provided by an instructor included, “I do not find online learning to be beneficial to developmental education students.”

Instructors believed that student outcomes were better for DE in-person courses over online courses, however, a few instructors believed that some students did benefit from online courses. For example, one instructor wrote, “[t]here can be a benefit from online courses after COVID for some students In particular, such courses can provide students with restrictive schedules or heavy outside commitments with access to the courses they need to continue to make progress in their degree program.” A final example included, “I have students who need to be at home for many reasons and the CAN work towards a degree which they could not do before.”

Many instructors believed that DE should not be taught online, while a few instructors believed online courses are necessary for some students to obtain an education. Instructors believed that in-person courses offered a more constant instructor support system that some students needed to succeed in college while online courses offered a means for students to continue in their education, especially when they were unable to attend in-person courses.

Categorized Grouping 4: Recommendations for Educators Teaching DE

Instructors offered advice for educators when preparing to teach online, which was based on their personal experiences of teaching during COVID-19. Table 26 shows that eleven instructors offered suggestions stemmed from their experience with teaching online, which included teaching practices to consider, a need for mandatory training, and having a contingency plan for future transfers to online teaching and learning. For example, one instructor wrote, “[i]t is important to be as accessible as possible. Professors need to answer emails daily if possible. We need to grade papers weekly to give constructive and timely feedback.” A second instructor wrote, “I feel that we need to

stay connected to our students. I send announcements twice a week to my online students and answer emails constantly. This helps them not feel so isolated.” A third instructor wrote, “[t]here should be provisions for emergency contacts by text and/or phone call.” A fourth instructor wrote, “[t]here needs to be some provisions made for students who find it difficult to stay motivated without weekly class contact. I send reminders if students are late turning in assignments. I allow late assignment turn-in with decreased points. I also allow 2 grace extensions without decreased points.” A final example provided by an instructor included, “[t]he main thing is that I think online training ought to be *mandatory* now. ... seeing how so many faculty struggled not just in the mid semester transition, but in the subsequent two full semesters of teaching online as well, I think it ought to be mandatory for faculty and adjuncts to get sufficient online training. I've brought this up with many university leaders ... and there is a reluctance to mandate any sort of training, as it is not something that is typically done. This is a real shame and opens us up to failing our students down the road if something like this happens again (or even a natural disaster that causes students to not be able to go to campus, such as a hurricane). Without mandating trainings like this, we fail our future students, full stop.”

Instructors who taught during COVID-19 offered suggestions for educators, based on personal experience. Suggestions to consider include course design and teaching practices. Online courses should include more interactions from instructors to students. Instructors who are to teach online courses should be taught online course design and online teaching practices. Also, educators need to make a contingency plan, which includes how to contact students in the case of future catastrophic events (i.e., pandemic, and weather-related events).

Many postsecondary DE courses were transferred from in-person courses to online courses due to COVID-19 during mid-semester in the spring of 2020, which had an impact on teaching and student learning. Many instructors and students were not prepared for the transfer. Some instructors changed their pedagogy to meet students' needs and some students adapted and excelled where others struggled to succeed. Some instructors believed that online courses were not as effective as in-person courses, however, they recognized that online courses allowed students a means to access or continue their education when they were unable to attend in-person courses. Also, instructors recognized the differences between teaching online and teaching in-person and made recommendations for teachers who were planning on teaching online. One such recommendation included requiring educators to undergo professional development and training on how to teach online. Suggestions were also made for instructors to reevaluate their teaching practices and beliefs about teaching and making sure their teaching practices meet the needs of their students, both in-person and online.

Chapter Summary

In this chapter I reported on the analyses used to prepare data that answered each research question, which includes results from the preliminary analyses that were used to prepare data for primary analyses. During preliminary analyses mean scores were calculated for each of the COI presence scales found during the exploratory factor analyses. Data from the factor analyses were used in primary analyses when comparing group data. Descriptive analyses identified the frequency and percentages of communication methods used when communicating course information, facilitating student learning activities, providing feedback. Open coding provided information on the

successes and challenges of teaching and relayed experiences of online educators as they transitioned to online teaching and learning during COVID-19.

The primary analyses revealed there were statistically significant differences between those who taught online before the pandemic or had plans to teach online before the pandemic and those instructors who were teaching online because of the pandemic on teaching presence on course structure, social presence on open communications, and cognitive presence on resolution. Also, instructors who taught asynchronous instruction viewed social presence (open communications) differently than instructors who taught synchronously. Instructors who taught asynchronous courses felt students were more comfortable engaging in online discussions than instructors who taught synchronous instruction. The results from the open coding analyses highlighted the challenges and successes of online teaching and learning. Many instructors found it a challenge to get students to engage with course resources and participate in synchronous course discussions. Many instructors conveyed that students who engaged with course resources and participated in discussions on a regular basis had a better outcome than students who did not engage or participate in the learning process on a regular basis. The open coding analyses also revealed the changes in teaching and learning that took place during the transfer from in-person to online instruction due to COVID-19. Some instructors questioned their teaching practices and beliefs on teaching, while others had not changed in their teaching practices or beliefs. Instructors perceived the transfer to online learning had an impact on students' attitude, motivation, and ability to succeed. Some students overcame their challenges and were successful while other students struggled with everyday life and academia. The open coding analysis also highlighted the differences

between online and in-person learning environments. Many instructors believed students were not ready for online learning while others observed students' resilience to excel in online learning. The experience of teaching during COVID-19 brought about the realization for some instructors that online courses were necessary for some students to obtain an education and that educators needed to be ready for teaching online.

Suggestions for readiness included teaching practices that included more teacher to student interactions, mandatory online teacher training, and creating contingency plans for future transfers to online instruction.

V. DISCUSSION

Little was known about the online teaching practices of developmental educators or how they perceived online teaching and learning within DE online environments. This study used the COI framework as a lens to view the perspectives of DE online educators and explore their views of teaching and learning within online learning environments (i.e., asynchronous, synchronous, emergency remote, and traditional online). Sixty-five instructors answered the questionnaire, and their data were used in analyses to answer the five research questions in this study, which identified the how DE instructors perceived online teaching and learning and identified differences between learning environments and delivery methods.

1. How does the COI framework describe instructor perceptions of online teaching within developmental education courses?
 - a. How do instructor demographic groups differ on mean scores between teaching, social, and cognitive presence?
 - b. How do online learning environment groups differ on mean scores for teaching, social, and cognitive presence?
 - c. How does the frequency of instructor engagement in online student discussions differ on mean scores for teaching, social, and cognitive presence?
2. What are the differences in levels of engagement in student discussion by demographic group and learning environment?

3. What methods are instructors using when communicating course information, facilitating discussions, and offering feedback to students enrolled in their online developmental education courses?
4. What successes and challenges do online developmental educators encounter in their online courses?
5. How has the transfer to online courses, due to COVID-19, affected the views of teachers who were teaching postsecondary developmental education courses during the onset of COVID-19?

Analysis of the data collected to answer these questions provided a more complete picture of teaching and learning in DE online learning environments.

This chapter starts with a discussion on the findings and results of this study, which includes comparisons between learning environments and delivery methods. Next, I provide the implications of the study's results, followed by direction for future research. This chapter ends with a summary of the study.

Discussion of Results

In this section I provide a discussion on the results of this study. I start with a discussion on the differences found between DE online learning environments and course delivery methods. Next, I discuss the shift in choice of communication methods, adaptive teaching measures, and building relationships. I end this section with a discussion on the effects of COVID-19 and the transition from in-person to online instruction.

Differences in DE Online Learning Environments

The results of this study indicated statistically significant differences in the online delivery groups and in the COVID-19 groups when measuring teaching, social, and

cognitive presence. The quantitative analyses indicated statistically significant differences on mean scores for teaching, social, and cognitive presence for participants who taught, or had plans to teach, online pre-COVID-19 (traditional online), for those who transferred online due to COVID-19 (emergency remote), and for participants who taught in an asynchronous DE online learning environment. Participants who taught traditional online instruction were more confident that they provided students with course structure, more than participants who taught emergency remote instruction. Also, statistically significant differences were found in how participants perceived their students' comfort of engagement when participating in online discussions, conversing through online medium, and interacting with others within the online environment. Participants who taught traditional online instruction felt that their students were more comfortable doing those things than participants who taught emergency remote instruction. Also, statistically significant results were found between participants who taught traditional online instruction and emergency remote instruction on their perceptions to reach resolution (cognitive presence). Meaning participants who taught traditional online instructions felt that their students reached resolution, whereas participants who taught emergency remote instruction felt that their students indicated less resolution (ability to develop solutions and apply them to practice as well as describe ways to test and apply knowledge created from engaging and participating in online learning activities (transfer of knowledge).

The Mann-Whitney U analyses also indicated statistically significant differences on mean scores between course delivery method groups (asynchronous vs synchronous) on social presence – comfort of engagement in discussions, comfort using online

medium, and comfort with interacting with other course participants in the online learning environment. Meaning that participants who delivered instruction asynchronously, felt that their students were more comfortable participating in online discussions, comfortable conversing in online medium, and comfortable interacting with others within their online learning environment compared to participants who taught synchronously. The open coding analysis supports these findings. Many participants conveyed that they were challenged in getting students to engage in online discussions or turn on their cameras or microphones in synchronous courses, making it hard to conduct online discussions. This occurrence was so prominent that participants labeled their students as “ghost” or “MIA” Also, participants conveyed that even when students turned on their microphones and cameras, they were not talking. One participant called breakout rooms “blackholes for disengaged students.” These results were supported by research (Greenhow et al., 2022). Greenhow et al. (2022) called this experience “staring at a blank screen” (p. 133). Some participants suggested that synchronous programs highlight the speaker, and many students are “uncomfortable”, “shy” and did not want to be “a sage on the stage,”

Results from the open coding analyses also revealed that participants thought “students were comfortable engaging in asynchronous discussions” but felt they were “not engaging in meaningful discussions” and “avoided discussions that required them to disagree with their fellow students.” Participants who used asynchronous discussions had more success in getting students to engage in discussion than participants who used synchronous discussions. Participants who used asynchronous discussions in their online instruction shared that their students were incredibly supportive of each other. Previous

research indicated that students were more comfortable participating in asynchronous discussions (Ajabshir, 2019; Brierton et al., 2016). However, results for this study indicated that participants felt that their students did not want to hurt the feelings of others, so they would avoid discussions requiring them to take debate or disagree with their fellow students. Instead, they would support students with positive niceties. Students would make comments such as “great job” “I like your comment” and, “I agree with what you said.” This suggests that participants' teaching strategies used to engage students were working and helping students recognize others in the learning environment, but the students were not engaging in deep learning. These results were supported by research that indicated when students were asked to engage in discussions requiring them to debate or be argumentative, conversations become hollow and did not produce conversations that contributed to the creation of new knowledge. (Horzum, 2015). However, research conducted by Sadaf et al. (2021) suggests that online student outcomes were higher for students when engaged in discussions that provided scenarios and problem-solving discussions compared to discussions that lacked problem-solving opportunities. The results from the open coding analysis revealed that participants felt students would avoid discussions that required them to disagree with other students. Many participants reported that students did not like to disagree with other students because they did not want to hurt the feelings of classmates. Participants reported using asynchronous discussions designed to solicit deep thinking; however, students were not engaging in deep-thinking conversations.

Based on these findings, I ran a crosstabulation analysis between traditional online and emergency remote groups to identify the online course delivery method that

participants transferred to when moving instruction online. The results from the crosstabulation analysis revealed that 25 out of 33 participants in the emergency remote group moved to teaching their students synchronously. Research indicated that many courses were moved to synchronous methods due to COVID-19 (Bannink & Dam, 2021; Ezra et al., 2021; Greenhow et al., 2022; Pregowska et al., 2021). I then ran two more crosstabulation analyses on the groups, one on type of professional development training, and the other on years of teaching online courses to see if there were differences between groups on online training and experience. Nineteen participants in the emergency remote group conveyed that they had some training, either from the Quality Matters program ($n = 6$) or from their institution ($n = 13$), while 12 were learned on the job. Twenty-four participants in the traditional online group also had training from both Quality Matters ($n = 12$) and from their institution ($n = 12$), where three learned on the job. The results from the crosstabulation for years teaching online and COVID-19 groups, indicated participants in the remote emergency group were equally divided ($n = 6$) on their online teaching experience (e.g., one to two -years of experience and over two-years of experience). Twenty participants in the traditional online group had over two years of online teaching experience. It might be that the participants were more prepared for online learning in the traditional group. Previous research indicates that instructors were not prepared for teaching in the emergency remote situation brought on by COVID-19 (Bannink & Dam, 2021; Ezra et al., 2021). The results from the crosstabulation analysis for this study indicated a difference between the two groups, but research is needed to determine the extent and impact of those differences.

Shift in Communication Methods

Results of this study revealed that participants employed various online communication methods when communicating with their students. Results from the frequency analysis revealed that participants used a wide range of methods when communicating information about the course to their students. However, the most popular methods used were virtual meetings, emails, and phone calls. Methods used for engaging students in course discussions were dependent on the course delivery method: virtual meetings were rated higher for participants in the synchronous group and forums were rated higher in the asynchronous group. These results differ from previous research that indicated that online instructors used methods they were most comfortable using, which were emailing and phone calling (Broadbent & Lodge, 2021; Darius et al., 2021; Graham, 2019; Harrison et al., 2017).

The results from the open coding analysis supported the use of virtual meetings. Several participants required their students to schedule virtual or in-person “check-in meetings” several times a semester with them or a tutor. The results from the open coding analyses revealed scheduling or requiring students to schedule virtual meetings was a teaching practice used in both asynchronous and synchronous instruction. Participants reported that virtual office hours were successful for them and their students, even though previous research indicated that some students may not access instructor office hours or communicate with their instructors on their own (Stine, 2010).

Adaptive Teaching

Results from this study indicated that some participants found it challenging to get students to engage in online learning. However, many participants were resilient and

adapted to meet the needs of their students by changing their teaching approach. The open coding analyses found that many participants felt student success was dependent on the student's choice to actively engage with course resources and participate in online discussions. Participants stated that when students engaged with the course resources regularly, they had better outcomes, however many were not engaging with resources. These results differ from previous research conducted by Stadler and O'Reilly (2021) who found no differences between the number of times undergraduate students accessed online course resources and student completion rates or grades, however they did suggest that students completed assignments without accessing the resources for assignments. Other research did support the finding for the successes and challenges of engaging students in online learning discussions. Hurt et al. (2012) found students were participating in asynchronous discussions, but not as intended, and Bannink and Dam (2021) found students were not engaging in synchronous discussions as intended. In my study, participants reported that students were hesitant to speak in synchronous discussions and many did not turn on their microphones or cameras. Previous research also indicated when students engaged in discussions, they increased knowledge construction and improved perceived learning, which positively influenced their final grades (Akyol et al., 2010).

Participants used different methods to engage students in discussions. One participant indicated success when calling students out by name to get them to engage in synchronous discussions. Another participant who was aiming for student-led discussions, realized students were not talking, and changed the rules for that group. Another tactic used by participants was to participate in discussions with students.

Results from the frequency analysis revealed that over 64% of participants engaged with students throughout the semester, while less than 25% engaged in student discussions for the first half of the semester, and less than 8% did not participate in student discussions. These results aligned with previous research conducted on asynchronous discussions that found that not all instructors participated in student discussions (Offenholley, 2012).

Discussions can be beneficial for instructors and students because instructors can learn more about their students and students can feel connected with others while learning (Garrison et al., 1999). Previous research indicated that instructors who participated only at the beginning of the semester and then faded out towards middle of the semester may overlook the possibility that some students may take longer to warm up, get comfortable with the online discussion formats, or find relevance in the discussions (Hurt et al., 2012).

Despite the disengagement of students in discussions, many instructors felt it necessary to continue trying different methods to engage their students in discussions. One participant contributed “I believe it is important to keep doing this even if the numbers are sometimes disheartening.” Previous research indicated that sometimes students have been known to change their opinions on participating in discussions as class progressed (Hurt et al., 2012).

Participants in this study perceived online teaching and learning differently and recognized that their instruction influenced students. Many instructors were successful at getting some students to engage; however, most students were not engaging in discussions as intended. Many participants felt more could have been done to engage

students and tried various teaching tactics. Professional development focused on strategies for student engagement in online courses may be helpful to meet this need.

Building Relationships

Open coding analysis results revealed most participants used discussions in their online course instruction and a few participants specifically included social activities to help students connect and build relationships. For example, one participant required students to personalize their online profile and add personal information about themselves, while other participants required students to create video projects. The participants who talked about video projects conveyed that “students personalities came out in the projects.” Previous research was limited that examined the use of video projects and personalizing student profiles to encourage social presence. Previous research supports the sharing of personal information to build personal relationships and allowing students to make distinct impressions of fellow students, which can be the key ingredient in getting students more engaged in learning (Lowenthal & Dunlap, 2020).

Effects of COVID-19 on Teaching and Student Learning

Many instructors were affected by the transfer from in-person courses to online courses due to COVID-19. Results from the open coding analysis was used to explore how the transfer impacted teaching and learning within DE courses. The results from this study identified changes in pedagogical practices, beliefs of online teaching and learning, and the effects on students. Instructors also offered advice on changes needed to prepare for future transitions to online instruction.

Many participants changed their views of online teaching and learning due to their experience of teaching during COVID-19, but some indicated no impact on their beliefs

of online teaching and learning. Instructors who changed their views of online teaching and learning did so because they recognized the personal struggles that their students were going through due to COVID-19. Instructors changed their teaching practices by extending deadlines or offering flexible deadlines (Spinks et al., 2021). However, some instructors reported that they did not change their teaching practices during the transfer from in-person to online instruction, relaying that COVID-19 had no impact on their teaching practices. These instructors used the same methods even if they transferred from in-person to online or were already online. Some participants said they had to make slight modifications but did not speculate on them. This implies that some instructors felt that teaching practices that they employed were versatile enough to work in both in-person and online instruction.

Other results revealed that some participants believed that students who enrolled in in-person instruction were more successful than students enrolled in online instruction. Many participants felt that online instruction should not be offered to students who need to take DE. One participant reported that despite the challenges brought on by COVID-19, students were “resilient,” despite students losing family members or jobs, and learning in isolation, they “persevered.” However, this was not true for all students. One participant conveyed a story about one of their students who dropped out of the emergency remote course. The participant said that the student found online instruction and college learning difficult, and they thought that they were not “college material.” Some participants believed their students should be self-regulated learners, and many felt that students enrolled in DE courses struggled to stay focused in online instruction (Cho & Heron, 2015; Garrison et al., 1999; Garrison et al., 2010; Zavarella & Ignash, 2009).

Another challenge that online participants faced during the transfer to online learning was inequity issues. Many students were unable to procure appropriate technology needed to access the course, with internet issues being the most common. Spinks et al. (2021) found that the transfer from in-person to online courses negatively impacted students with disabilities, those who lacked appropriate technology, and students from low social economic backgrounds. Many students enrolled in DE courses may be from low-income households and unable to afford computers or the internet and the transfer to online instruction could hinder their ability to attend or continue their education. Participants reported issues with staying connected to the internet. Without stable internet, synchronous classes were disrupted, became a big challenge, and made it difficult to conduct productive instruction. The results from this study implied that the infrastructure of online courses may need to be examined to support instructors and their students when transferring from in-person courses to online courses.

Finally, instructors expressed a need for and the importance of mandatory training for online instructors and for a contingency plan to prepare for future transfers to emergency remote teaching and learning. Scherer et al. (2023) suggested that instructor's readiness and experiences can vary across spectrums, and the more experience a teacher has does not necessarily mean they have higher levels of readiness. They suggest that both the novice and experienced teachers could benefit from readiness intervention programs and institutional support (Scherer et al., 2023).

The experience of teaching during COVID-19 and the transfer from in-person to online learning formats had an impact on many participants. The experience highlighted a more personal side of the instructors, showing the empathy they felt for their students

during their life struggles inside and outside academia. The experience made participants question their beliefs of teaching and student learning. Some changed their views and practices of teaching instruction and students learning within DE online environments. Participants reported that the experience of teaching during COVID-19 also created an “awareness of the inequalities,” “challenges,” and “opportunities for learning” that might not have been previously considered.

Results from this exploratory study uncovered how DE instructors perceived teaching and learning in their online learning environments. Participants felt they were not prepared and that their students were not prepared for online teaching and learning. The transfer to remote learning influenced how instructors perceived their teaching practices and student learning. Statistical significance was found during qualitative analyses between course delivery methods and those who were teaching during the onset of COVID-19. Open coding analyses revealed that more participants found challenges when getting students to engage and participate in online discussions, learning activities, and access course resources. When talking about successes of teaching and learning within DE online learning environments one participant conveyed the sentiments of many others. “I have found the most successful methods of teaching online involved trying a combination of things until I found the right combination for that class and those students. ... Each class is different and what worked in one [online] class may not work in another.” Open coding analyses also revealed that participants had the most success by intervening or adapting teaching practices to meet the needs of their students.

Implications

The findings in this study had several implications and may influence how instructors, professional development coordinators, and officials of higher education institutions view teaching and learning in DE online learning environments.

Instructors who are planning to teach DE online instruction should know that online teaching and learning can be more challenging than in-person teaching and learning and there is not a one-size-fits all teaching solution for online student (Armstrong et al., 2022; Ezra et al., 2021), which was also conveyed in the results from the open coding analyses of this study. Participants expressed that they had to try different tactics until they found the right combination that worked for them and their students. Previous research indicated that diversifying teaching practices for online learning to engage students in the learning process can promote knowledge transfer of the learners (Tan, 2022). The results found in the open coding analyses of this study conveyed that many participants were concerned about their students' success. Participants changed teaching practices to meet their students' needs such as extending or changing student deadlines, requiring students to schedule check-in meetings, and intervening in student discussions and learning activities when students were not engaging as intended. Other participants felt the importance of keeping their students connected and used synchronous methods within their asynchronous instruction to connect students, which some found helpful in creating a sense of community.

This study also had implications for professional development coordinators, which may influence online teacher training, and may need to consider asynchronous and synchronous methods within their training. Professional development coordinators should

reevaluate professional development programs used to prepare educators for teaching asynchronous and synchronous online instruction. Results from the open coding analyses found that many participants wanted training and thought it should be mandatory. When looking at the results from the crosstabulations between traditional online and emergency remote instruction, many participants had previous online training either through Quality Matters or from their institution, yet participants still conveyed they needed training, implying that training may need to be updated to reflect the needs of the instructor as well as the students. The open coding analyses in this study revealed that many of the participants who taught synchronous courses transferred from in-person courses and were unaware of how to use the technology, the time commitment to prepare online resources, redesign assignments, and the influences it would have on student learning. Many participants suggested that online training should be mandatory, and they needed universal teaching practices that could be easily transferred from in-person instruction to online instruction. Many participants were not prepared for the transfer to online instruction and used in-person practices to teach students when instructing online. Most participants who transferred to online instruction reported the biggest challenge of the transfer was the time it took to prepare for online instruction. Many participants commented that they did not realize the time commitment needed to prepare for online instruction. Some participants also reported that students were the ones that “got left behind” during the transfer due to the adjustment and time consumption of preparing for teaching online instruction. and online teaching experience, many participants had some training in online instruction not prepared for online teaching. Results from the Mann-Whitney U analyses also supported that participants who transferred to online instruction

felt that they were not as prepared for teaching online, and their students were less comfortable and successful at knowledge transfer compared to participants who were ready for online teaching and their students were ready for online learning. There were also differences found within asynchronous and synchronous instruction that supports differences between the two delivery methods and student engagement in learning activities. Previous research indicated that novice teachers and teachers with much experience could both benefit from readiness intervention programs and institutional support (Scherer et al., 2023).

Lastly, higher education administrators may want to consider that some students may not have access to technology needed to obtain an education online as found in the results from the open coding analyses. Several participants conveyed the transfer to online learning during COVID-19 “made it more difficult for students with socioeconomic challenges ... to keep up” suggesting that their needs and “inequity were more pronounced” after moving courses online. Many participants reported that they also had trouble with “keeping a good internet connection” and technology did not always work. Participants also suggested “there needs to be a contingency plan” in case we have to change education to online delivery again “due to some natural disaster” or “health crisis.” Education officials may also need a contingency plan for those who do not have access to adequate technology so they too can continue their education online if education gets moved online again in the future.

Future Research

This study only explored the DE online learning environments through the perspectives of educators who taught online and were transferred online during a

pandemic. However, this study was only the beginning of the investigation into understanding the DE online learning environment and the roles of the instructor when supporting online student learning. Much research still needs to be conducted to gain a full picture of online teaching and learning in DE online courses.

First, because any instructors voiced their concerns for student success in online learning, research is needed that focuses on the individual types of DE course subjects and identifies instructor roles and student roles in the different DE online learning environments.

Second, a study should be conducted to explore the differences between asynchronous and synchronous online learning environments and to compare student engagement in discussions. The results from this study brought to questions differences between the two delivery methods and why students are not participating in discussions as intended in asynchronous instruction or turning on their cameras and microphones in synchronous instruction. More research needs to focus on discussions in DE online learning environments.

Third, a comparison of instructor perceptions and student perceptions on teaching, social, and cognitive presence using the COI survey from Arbaugh et al. (2008) and the COI: Educators' Perspective questionnaire created for this study to see how instructors and students differ in their perceptions of online teaching, social, and cognitive presence.

Finally, much research that looked at DE online learning compared hybrid and in-person courses, which had some elements of in-person interaction. However, teaching practices and student learning behaviors are different for in-person interactions than online interactions (Bannink & Dam, 2021). Online courses should be compared to online

courses. For example, fully online, traditional, asynchronous, and synchronous courses without in-person elements should be explored to uncover challenges and successes of truly online courses.

Chapter Summary

This study contributes to the much-needed literature and research that informs teaching and learning in DE online learning environments. I first provided an in-depth discussion of major findings in this exploratory study. Findings highlight teaching and learning in DE online asynchronous, synchronous, emergency remote, and traditional online learning environments. Analyses exposed successes and challenges of teaching and learning in DE online learning environments, types of technology used within the environments, and teaching practices used by participants to engage students in the online learning experience. Statistically significant results were obtained from this study that showed there was a difference between online course delivery methods that may have been influenced by the participants online learning experience and training. There was a shift from emails and forums to virtual meetings and forums as the most popular method used by participants to communicate with students. Participants also adapted their teaching practices to meet the needs of their students and helped students stay connected. I also provide a view into the experience of teaching and learning during COVID-19. Participants felt students were influenced by the experiences and that some students adapted better than others.

Second, I provided implications for instructors, professional development coordinators, and postsecondary officials based on the results of this study. Many instructors were not prepared for online teaching and learning. An instructor's

experience, training, adaptability, and resilience to meet their students' needs are essential elements needed to create successful DE online learning environments.

Professional development coordinators may need to reevaluate their programs to make sure they meet instructor and student needs, especially when planning training that is designed to meet their needs. Postsecondary officials may need to take in consideration not all students may have access to highspeed internet, or the technology needed to access and attend courses online.

Finally, I provided directions for future studies. This study was the first step in exploring DE online teaching and learning but more information is still needed to fully understand instructor and student communication practices, roles of engagement, and learning activities used to engage students enrolled in various DE learning environments and how those practices may influence student learning.

APPENDIX SECTION

Appendix A

The information in this section was used to recruit participants. Emails and flyers were sent out or handed out to educators who were affiliated or practitioners of DE instruction.

Figure A1

Participant Recruitment Invitation Email Letter

This email message is an approved request for participation in research that has been approved by the Texas State Institutional Review Board (IRB).

This is a request for participation in research that has been approved by the Texas State Institutional Review Board (IRB).

Hi, I am Holly Shinn, a graduate student at Texas State University, and I am conducting a research study to identify online technological methods used by online developmental educators to communicate with students. Also, to gather information on successful teaching practices used by online developmental educators. You are being asked to complete this survey because of your connection to developmental education (aka remedial or non-credit bearing mathematics, reading, writing, English, and learning frameworks/college readiness), where you either teach developmental education courses or can distribute to those who are teaching developmental education. Participation is voluntary. The survey will take approximately 20 minutes or less to complete. You must be at least 18 years old to take this survey. This study involves no foreseeable serious risks. We ask that you try to answer all questions; however, if there are any items that make you uncomfortable or that you would prefer to skip, please leave the answer blank. Your responses are anonymous. Possible benefits from this study are identifying best practices of teaching developmental education online, pedagogical successes and challenges, and will add to the literature for the field of developmental education. Online instructors, course designers, professional development coordinators, and ultimately the student could benefit from the information gained from this study.

Even though this study does not compensate you for your contributions, you can choose to leave your email address to be entered in a drawing for one of four Visa \$25 gift cards. The winners will be randomly drawn, and winners will be notified using the email they provided at the end of the study. Reasonable efforts will be made to keep the personal information in your research record private and confidential. Any identifiable information obtained in connection with this study will remain confidential and will not be disclosed. The members of the research team and the Texas State University Office of Research



Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants. Emails will be deleted after winners are awarded. Emails, or any other personal information, will not be used in any written reports or publications which result from this research. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed. If you have any questions or concerns, feel free to contact Holly Shinn or her faculty advisor Dr. Jodi Holschuh.

Click on the following link start the survey [Link to Online Instructors Perceptions Questionnaire](https://txstate.co1.qualtrics.com/jfe/form/SV_5uq8KjID4gtfAHZ). You can also type https://txstate.co1.qualtrics.com/jfe/form/SV_5uq8KjID4gtfAHZ in browser or use the QR code.

If you have any questions or concerns, feel free to contact Holly Shinn or her faculty advisor Dr. Jodi Holschuh:

Holly Shinn, graduate student

Curriculum & Instruction

(512) 787-6423

hb35334@txstate.edu

Dr. Jodi Holschuh, supporting faculty

Curriculum & Instruction

(512) 245-7906

holschuh@txstate.edu

This project 7749 was approved by the Texas State IRB on May 5, 2021. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu).

If you would prefer not to participate, please do not fill out a survey.

If you consent to participate, please complete the survey.

Thank you!

Figure A2



Appendix B

This document is the IRB Approval form, which includes the IRB number and date of approval.



The rising STAR of Texas

In future correspondence please refer to 7749

May 5, 2021

Holly Shinn
Texas State University
601 University Dr. San
Marcos, TX 78666

Dear Holly:

Your application titled, '*Community of Inquiry: Online Developmental Educators Perspectives*' was reviewed by the Texas State University IRB and approved. It was determined there are: (1) research procedures consistent with a sound research design and they did not expose the subjects to unnecessary risk. (2) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (3) selection of subjects are equitable; and (4) the purposes of the research and the research setting are amenable to subjects' welfare and produced desired outcomes; indications of coercion or prejudice are absent, and participation is clearly voluntary.

In addition, the IRB found you will orient participants as follows: (1) signed informed consent is not required as participation implies consent; 2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data; (3) Appropriate safeguards are included to protect the rights and welfare of the subjects; (4) Participants will be offered a chance enter and win one of four \$25 Visa gift-cards.

**This project was approved at the Exempt Review Level
This project does not involve in person research activities with participants**

Check the IRB website frequently for guidance on how to protect participants. It is the expectation that all researchers follow current federal and state guidelines. Approved research activities did not indicate face-toface research with human subjects only secondary data analysis. Interactions with participants are in context as an employee providing therapy following clinics guidelines.

The institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments, please re-apply. Copies of your request for human subject's review, your application, and this approval are maintained in the Office of Research Integrity and Compliance.

Report any changes to this approved protocol to this office. Notify the IRB of any unanticipated events, serious adverse events, and breach of confidentiality within 3 days.

Sincerely,

A handwritten signature in cursive script that reads "Maica Inzales".

Monica Gonzales
IRB Compliance Specialist
Research Integrity and Compliance
Texas State University

Cc: Dr. Jodi Holschuh

OFFICE OF RESEARCH AND SPONSORED
PROGRAMS
601 University Drive | JCK #489 | San Marcos, Texas 78666-
4616 Phone: 512.245.2314 | fax: 512.245.3847 |
WWW.TXSTATE.EDU

This letter is an electronic communication from Texas State University-San Marcos, a member of The Texas State University System.

This is an approved request for participation in research that has been approved by the Texas State Institutional Review Board (IRB).

Holly Shinn, a graduate student at Texas State University, is conducting a research study to identify online technological methods used by online developmental educators to communicate with students. Also, to gather information on successful teaching practices used by online developmental educators. You are being asked to complete this survey because of your connection to developmental education (aka remedial or non-credit bearing mathematics, reading, writing, English, and learning frameworks/college readiness), where you either teach developmental education courses or can distribute to those who are teaching developmental education.

Participation is voluntary. The survey will take approximately 20 minutes or less to complete. You must be at least 18 years old to take this survey.

This study involves no foreseeable serious risks. We ask that you try to answer all questions; however, if there are any items that make you uncomfortable or that you would prefer to skip, please leave the answer blank. Your responses are anonymous.

Possible benefits from this study are identifying best practices of teaching developmental education online, pedagogical successes and challenges, and will add to the literature for the field of developmental education. Online instructors, course designers, professional development coordinators, and ultimately the student could benefit from the information gained from this study.

Even though this study does not compensate you for your contributions, you can choose to leave your email address to be entered in a drawing for one of four Visa \$25 gift cards. The drawing will take place no later than May 15th, 2021. The winners will be randomly drawn, and winners will be notified using the email they provided at the end of the study. Reasonable efforts will be made to keep the personal information in your research record private and confidential. Any identifiable information obtained in connection with this study will remain confidential and will not be disclosed. The members of the research

team and the Texas State University Office of Research Compliance (ORC) may access the data. The ORC monitors research studies to protect the rights and welfare of research participants. Emails will be deleted after winners are awarded. Emails, or any other personal information, will not be used in any written reports or publications which result from this research. Data will be kept for three years (per federal regulations) after the study is completed and then destroyed.

If you have any questions or concerns, feel free to contact Holly Shinn or her faculty advisor Dr. Jodi Holschuh:

Holly Shinn, graduate student
Curriculum & Instruction
(512) 787-6423
hb35334@txstate.edu

Dr. Jodi Holschuh, supporting faculty,
Curriculum & Instruction
(512) 245-7906
holschuh@txstate.edu

This project 7749 was approved by the Texas State IRB on May 5, 2021. Pertinent questions or concerns about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Denise Gobert 512-716-2652 – (dgobert@txstate.edu) or to Monica Gonzales, IRB Regulatory Manager 512-245-2334 - (meg201@txstate.edu).

If you would prefer not to participate, please do not fill out a survey.
If you consent to participate, please complete the survey.



Appendix C

In this section I have provided a copy of the online Qualtrics 52 question survey used to collect data for this study. The first 34 questions are Likert scale questions used to collect data from participants on Community of Inquiry: Educators' Perspective instrument. The remaining eighteen questions were created for this study and used to collect data on participants individual demographics and characteristics.

The Educators' Perspective of Online Learning Questionnaire

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Does Not Apply to Me
Getting to know other course participants gave students a sense of belonging in the course.	<input type="radio"/>				
Students were able to form distinct impressions of some course participants.	<input type="radio"/>				
Online or web-based communication is an excellent medium for social interaction. (No Change)	<input type="radio"/>				
Students felt comfortable conversing through the online medium.	<input type="radio"/>				
Students felt comfortable participating in the course discussions.	<input type="radio"/>				
Students felt comfortable interacting with other course participants.	<input type="radio"/>				
Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	<input type="radio"/>				
Students felt their point of view was acknowledged by other course participants.	<input type="radio"/>				
Online discussions helped students develop a sense of collaboration.	<input type="radio"/>				
Problems posed increased the students' interest in issues with the course.	<input type="radio"/>				
Students were curious about course activities.	<input type="radio"/>				
Students felt motivated to explore content related questions.	<input type="radio"/>				
Students utilized a variety of information sources to explore problems posed in this course.	<input type="radio"/>				
Brainstorming and finding relevant information helped students resolve content related questions.	<input type="radio"/>				
Online discussions were valuable in helping students appreciate different perspectives.	<input type="radio"/>				
Combining new information helped students answer questions raised in course activities.	<input type="radio"/>				

Learning activities helped students construct explanations/solutions.	<input type="radio"/>				
Reflection on course content and discussions helped students understand fundamental concepts in this class.	<input type="radio"/>				
Students can describe ways to test and apply the knowledge created in this course.	<input type="radio"/>				
Students developed solutions to course problems that can be applied in practice.	<input type="radio"/>				
Students can apply the knowledge created in this course towards future courses or other non-class related activities.	<input type="radio"/>				
Overall, I clearly communicate important course topics.	<input type="radio"/>				
Overall, I clearly communicate important course goals.	<input type="radio"/>				
Overall, I provide clear instructions on how to participate in course learning activities.	<input type="radio"/>				
Overall, I clearly communicate important due dates/time frames for learning activities.	<input type="radio"/>				
Overall, I am helpful in identifying areas of agreement and disagreement on course topics that help students to learn.	<input type="radio"/>				
Overall, I am helpful in guiding the class towards understanding course topics in a way that helps students clarify their thinking.	<input type="radio"/>				
Overall, I help to keep course participants engaged and participating in productive dialogue.	<input type="radio"/>				
Overall, I help keep the course participants on task in a way that helps students learn.	<input type="radio"/>				
Overall, I encourage course participants to explore new concepts in courses.	<input type="radio"/>				

Overall, my actions reinforce the development of a sense of community among course participants.

Overall, I help to focus discussion on relevant issues in a way that helps students to learn.

Overall, I provide feedback that helps students understand their strengths and weaknesses relative to the course's goals and objectives.

Overall, I provide feedback in a timely fashion.

Select the appropriate employment status.

- Full-time Faculty
- Part-time/Adjunct

Select the appropriate type of learning institution in which you are employed. Select all that apply.

- Community College
- Trade / Technical College
- University

Select the best choice that fits your situation.

- The online courses that I teach are considered co-requisite courses and are paired with college level courses, however, I am only responsible for teaching the developmental level content to students.
- The online courses that I teach are considered co-requisite courses and are paired with college level courses, however, I am only responsible for teaching the college level content to students.
- The online courses that I teach are considered co-requisite courses, are paired with college level courses, and I am responsible for teaching both developmental level content and college level content.
- The online courses that I teach are NOT considered co-requisite or paired courses.

Briefly describe your experiences. Please share some of the successes and or challenges of communicating with online students using online methods.

Select the best choice.

- My online classes meet at a set time (synchronous real-time). I require students to log into a virtual program (e.g., Zoom, Adobe Connect, Moodle, etc.) with audio and video capabilities to attend class.
- My online classes are online; however, I do not require my students to meet at a set time or use a virtual program (e.g., Zoom, Adobe Connect, Moodle, etc.) with audio and video capabilities to attend class. We do not meet in real-time.

Click all that apply. Select all courses, which you have taught in the past 5 years or are presently teaching.

- Learning Frameworks
- Basic Mathematics
- Intermediate Mathematics
- Pre-College Algebra Mathematics
- Developmental Writing
- Developmental Reading
- Integrated Reading and Writing
- Other _____

Select the best choice that fits your situation. How many years have you been *teaching online* courses?

- Less than 1 year
- 1 year to 2 years
- more than 2 years

Select the best choice that fits your situation. How many *years total* have you been teaching developmental education courses in higher education?

- Less than 1 year
- 1 - 2 years
- 2 - 5 years
- 6 - 10 years
- over 10 years

Select the statement that best fits your situation.

- I have attended professional development training and I am certified in online teaching through Quality Matters.
- I have attended professional development training and I am certified in online teaching through my institution.
- I have attended some professional development training and I am working towards a certification in online teaching.
- I am learning on-the-job and have not had the opportunity to attend formal training for online teaching.

Select all that apply. Which of the following methods have you used or are currently using to **communicate course goals and course topics** to online students?

- Email
- Phone Call
- Virtual Meeting (Zoom, Adobe Connect, Moodle, etc.)
- Chat Room
- Social Media (Twitter, Facebook, Instagram, etc.)
- Discussion Board or Forum
- Blog
- Class Website
- Notes on assignments
- Other _____

Select all that apply. Which of the following methods have you used or are currently using to **provide direct instructions and feedback** to students?

- Email
- Phone Call
- Virtual Meeting (Zoom, Adobe Connect, Moodle, etc.)
- Chat Room

- Social Media (Twitter, Facebook, Instagram etc.)
- Discussion Board or Forum
- Blogs
- Class Website
- Notes on assignments
- Other _____

Select all that apply. Which of the following methods have you used or are currently using to **facilitate and engage in online discussions** with students?

- Email
- Phone Call
- Virtual Meeting (Zoom, Adobe Connect, Moodle, etc.)
- Chat Room
- Social Media (Twitter, Facebook, Instagram etc.)
- Discussion Board or Forum
- Blogs
- Class Website
- Notes on assignments
- Other _____

Select the statement that best describes your teaching practices.

- I find that I engage in academic and social online discussions with students throughout the semester.
- I find that I engage in academic and social online discussions with students at the beginning of a semester and then taper off towards the middle or end of the semester.
- I do not engage in academic and social online discussions with students.

Select best choice that fits your situation.

- The courses that I teach are online developmental courses and were online before the world-wide pandemic (Co-VID 19) changed the landscape of education.
- The courses that I teach are online, but only because they were moved online due to the health risk-involved with the world-wide pandemic (Co-VID 19).
- The courses that I teach, already had plans to move to online delivery methods before the world-wide pandemic (Co-VID 19) changed the educational landscape. The pandemic was just a coincidence.
- The courses I teach are online, but I am new to online teaching and unsure if my courses were online before the world-wide pandemic (Co-VID 19).

The world-wide pandemic (Co-VID 19) has changed the landscape of education. You are the experts teaching on the frontlines within the field, pioneers of teaching during a world-wide pandemic. Your experiences, views, and advise can benefit many.

Briefly describe, how the world-wide pandemic has affected your views on teaching and student learning in developmental education.

Fill-in the blank. Type your ethnicity in the textbox.

Select the best choice that fits your situation. What is your age category?

- less than 30
- 30 - 49
- 50 - 59
- 60 or over

Fill-in the blank. Type your gender in the text box.

Thank you for your participation in the Study! Please click on Yes or No below. (*Your choice will highlight*). Once your choice is highlighted, click on the arrow to continue.

- No thank you! I will opt out of the gift card give-away drawing.
- Yes, please enter me in the gift card drawing so I can have a chance at winning one of the \$25 Visa Gift cards!

Because this survey is anonymous, a separate link has been set up to collect your email for the gift card drawing that is no way associated with your survey entries. Please click on the following link to leave your email address for a chance to win one of four Visa gift cards. https://txstate.co1.qualtrics.com/jfe/form/SV_0vSHeH4hmMBPxZ4

Gift Card Drawing

Thank you for taking the time to complete the survey. To be entered in the gift card drawing, please enter your email address in the text box below and then click the arrow to submit. You will be contacted if you are one of the four winners.

Appendix D

In this section I have placed the adopted (Gurley, 2018) and adapted (Arbaugh et al., 2008) 34 questions used in this study to create for the COI questionnaire.

Table D1

This chart shows the adopted version from Gurley (2018) for teaching presence items used on the COI questionnaire.

Community of Inquiry Teaching Presence	
Arbaugh et al. (2008) Student Perspective (original)	Gurley (2018) Educators' Perspectives (Adopted for this study)
The instructor clearly communicated important course topics.	Overall, I clearly communicate important course topics.
The instructor clearly communicated important course goals.	Overall, I clearly communicate important course goals.
The instructor provided clear instructions on how to participate in course learning activities.	Overall, I provide clear instructions on how to participate in course learning activities.
The instructor clearly communicated important due dates/time frames for learning activities.	Overall, I clearly communicate important due dates/time frames for learning activities.
The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.	Overall, I am helpful in identifying areas of agreement and disagreement on course topics that help students to learn.
The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.	Overall, I am helpful in guiding the class towards understanding course topics in a way that helps students clarify their thinking.
The instructor helped to keep course participants engaged and participating in productive dialogue.	Overall, I help to keep course participants engaged and participating in productive dialogue.
The instructor helped keep the course participants on task in a way that helped me to learn.	Overall, I help keep the course participants on task in a way that helps students learn.
The instructor encouraged course participants to explore new concepts in this course.	Overall, I encourage course participants to explore new concepts in courses.
Instructor actions reinforced the development of a sense of community among course participants.	Overall, my actions reinforce the development of a sense of community among course participants.
The instructor helped to focus discussion on relevant issues in a way that helped me to learn.	Overall, I help to focus discussion on relevant issues in a way that helps students to learn.
The instructor provided feedback that helped me understand my strengths and weaknesses.	Overall, I provide feedback that helps students understand their strengths and weaknesses relative to the course's goals and objectives.
The instructor provided feedback in a timely fashion.	Overall, I provide feedback in a timely fashion.

Table D2

This figure shows the adapted version of Arbaugh et al. (2008) for social and cognitive presence items on the COI questionnaire.

Community of Inquiry (Adapted)	
Arbaugh et al. (2008) Student Perspective	Adapted Instructor' Perspective
Social Presence	
Getting to know other course participants gave me a sense of belonging in the course.	Getting to know other course participants gave students a sense of belonging in the course.
I was able to form distinct impressions of some course participants.	Students were able to form distinct impressions of some course participants.
Online or web-based communication is an excellent medium for social interaction.	Online or web-based communication is an excellent medium for social interaction.
I felt comfortable conversing through the online medium.	Students felt comfortable conversing through the online medium.
I felt comfortable participating in the course discussions.	Students felt comfortable participating in the course discussions.
I felt comfortable interacting with other course participants.	Students felt comfortable interacting with other course participants.
I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
I felt that my point of view was acknowledged by other course participants.	Students felt their point of view was acknowledged by other course participants.
Online discussions help me to develop a sense of collaboration.	Online discussions helped students develop a sense of collaboration.
Cognitive Presence	
Problems posed increased my interest in course issues.	Problems posed increased the students' interest in issues with the course.
Course activities piqued my curiosity.	Students were curious about course activities.
I felt motivated to explore content related questions.	Students felt motivated to explore content related questions.
I utilized a variety of information sources to explore problems posed in this course.	Students utilized a variety of information sources to explore problems posed in this course.
Brainstorming and finding relevant information helped me resolve content related questions.	Brainstorming and finding relevant information helped students resolve content related questions.

Community of Inquiry (Adapted)

Online discussions were valuable in helping me appreciate different perspectives.	Online discussions were valuable in helping students appreciate different perspectives.
Combining new information helped me answer questions raised in course activities.	Combining new information helped students answer questions raised in course activities.
Learning activities helped me construct explanations/solutions.	Learning activities helped students construct explanations/solutions.
Reflection on course content and discussions helped me understand fundamental concepts in this class.	Reflection on course content and discussions helped students understand fundamental concepts in this class.
I can describe ways to test and apply the knowledge created in this course.	Students can describe ways to test and apply the knowledge created in this course.
I have developed solutions to course problems that can be applied in practice.	Students developed solutions to course problems that can be applied in practice.
I can apply the knowledge created in this course to my work or other non-class related activities.	Students can apply the knowledge created in this course towards future courses or other non-class related activities.

Appendix E

In this section I provide information about the preliminary results from the exploratory factor analysis conducted on data derived from the COI questionnaire for teaching, social, and cognitive presences.

Appendix E:1 Teaching Presence Initial Factor Analysis Pattern Matrix

This table shows the loading values from the initial exploratory factor analysis for teaching presence. Loading factors above .3 are in bold.

Table E1

Exploratory Factor Analysis Teaching Presence Pattern Matrix^a

Items	Factor			
	1	2	3	4
Q15_7_TP Overall, I help to keep course participants engaged and participating in productive dialogue.	.921	-.025	-.093	.118
Q15_11_TP Overall, I help to focus discussion on relevant issues in a way that helps students to learn.	.683	-.064	.163	-.092
Q15_10_TP Overall, my actions reinforce the development of a sense of community among course participants.	.590	.044	.060	-.179
Q15_8_TP Overall, I help keep the course participants on task in a way that helps students learn.	.362	.117	.263	.067
Q15_5_TP Overall, I am helpful in identifying areas of agreement and disagreement on course topics that help students to learn.	.319	.083	-.070	-.010
Q15_1_TP Overall, I clearly communicate important course topics.	-.110	.891	.038	-.082
Q15_3_TP Overall, I provide clear instructions on how to participate in course learning activities.	.087	.699	-.266	.212
Q15_6_TP Overall, I am helpful in guiding the class towards understanding course topics in a way that helps students clarify their thinking.	.296	.575	-.081	.062
Q15_2_TP Overall, I clearly communicate important course goals.	-.057	.501	.155	.341
Q15_12_TP Overall, I provide feedback that helps students understand their strengths and weaknesses relative to the course's goals and objectives.	.106	-.278	.779	.148
Q15_13_TP Overall, I provide feedback in a timely fashion.	-.096	.015	.700	.282

Note. N = 52. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading values above .3 appear in bold. Adapted from Gurley, L. E. (2018). Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. *Online Learning*, 22(2), 197–220.

a. Rotation converged in 3 iterations.

Table E2

This table shows the loading values from the initial exploratory factor analysis for social presence. Loading factors above .3 are in bold.

Social Presence Initial Pattern Matrix^a

	Factor	
	1	2
Q16_5_SP Students felt comfortable participating in the course discussions.	.975	-.145
Q16_4_SP Students felt comfortable conversing through the online medium.	.892	-.077
Q16_6_SP Students felt comfortable interacting with other course participants.	.805	.135
Q16_3_SP Online or web-based communication is an excellent medium for social interaction.	.450	.298
Q16_7_SP Students felt comfortable disagreeing with other course participants while still maintaining a sense of trust.	.421	.105
Q16_2_SP Students were able to form distinct impressions of some course participants.	-.089	.785
Q16_9_SP Online discussions helped students develop a sense of collaboration.	.096	.772
Q16_8_SP Students felt their point of view was acknowledged by other course participants.	.129	.674
Q16_1_SP Getting to know other course participants gave students a sense of belonging in the course.	-.070	.648

Note. N = 51. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading above .4 are in bold. Adopted from Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, R., Ice, P., Richardson, J., Shea, P., & Swan, K. (2008). Community of inquiry framework: Validation and instrument development. *The International Review of Research in Open and Distributed Learning*, 9(2), 133–136 (<https://doi.org/10.19173/irrodl.v9i2.573>).

a. Rotation converged in 3 iterations.

Table E3

This table shows the loading values from the initial exploratory factor analysis for cognitive presence. Loading factors above .3 are in bold.

Cognitive Presence Initial Pattern Matrix^a

	Factor		
	1	2	3
Q16_18_CP Reflection on course content and discussions helped students understand fundamental concepts in this class.	.884	-.060	-.048
Q16_17_CP Learning activities helped students construct explanations/solutions.	.748	-.100	.254
Q16_21_CP Students can apply the knowledge created in this course towards future courses or other non-class related activities.	.747	.239	-.074
Q16_15_CP Online discussions were valuable in helping students appreciate different perspectives.	.657	-.015	.039
Q16_19_CP Students can describe ways to test and apply the knowledge created in this course.	.541	.333	-.107

Q16_12_CP Students felt motivated to explore content related questions.	-.062	.802	.262
Q16_11_CP Students were curious about course activities.	-.001	.775	.154
Q16_10_CP Problems posed increased the students' interest in issues with the course.	.014	.559	.235
Q16_20_CP Students developed solutions to course problems that can be applied in practice.	.450	.478	-.289
Q16_16_CP Combining new information helped students answer questions raised in course activities.	.441	-.098	.686
Q16_14_CP Brainstorming and finding relevant information helped students resolve content related questions.	-.209	.239	.643
Q16_13_CP Students utilized a variety of information sources to explore problems posed in this course.	.006	.319	.404

Note. N = 51. The extraction method was principal axis factoring with an oblique (promax with Kaiser normalization) rotation. Factor loading above .4 are in bold. Adopted from Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, R., Ice, P., Richardson, J., Shea, P., & Swan, K. (2008). Community of inquiry framework: Validation and instrument development. *The International Review of Research in Open and Distributed Learning*, 9(2), 133–136 (<https://doi.org/10.19173/irrodl.v9i2.573>).

a. Rotation converged in 3 iterations.

Appendix E4

Initial Teaching Presence Scale Eigenvalues

This chart shows eigen values over the value of 1 and total variance between factors on the teaching presence scale. The chart was generated from the preliminary analysis.

Teaching Presence Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	Loadings % of Variance	Cumulative %	
1	4.620	35.537	35.537	4.125	31.727	31.727	3.768
2	1.808	13.906	49.443	1.269	9.764	41.491	2.662
3	1.359	10.454	59.896	1.007	7.747	49.239	1.407
4	.989	7.607	67.504				
5	.805	6.193	73.697				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure E5

This is a graph of the initial exploratory factor analysis conducted on teaching presence scale. Factor loadings are from 2 to 4 factors.

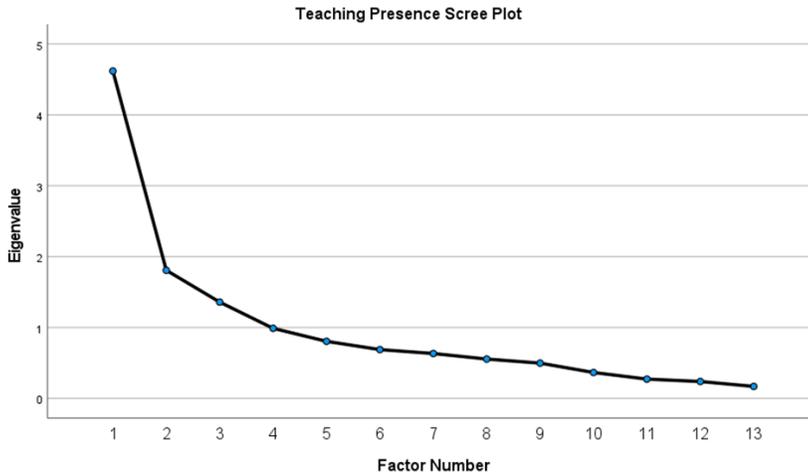


Table E6

This chart shows eigen values over the value of 1 and total variance between factors on the social presence scale. The chart was generated from the preliminary analysis.

Social Presence Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	4.630	51.445	51.445	4.259	47.317	47.317	3.776
2	1.323	14.696	66.141	.932	10.354	57.671	3.408
3	.817	9.072	75.213				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure E7

Social Presence Scree Plot

This is a graph of the initial exploratory factor analysis conducted on social presence scale. Factor loadings are from 2 to 3 factors.

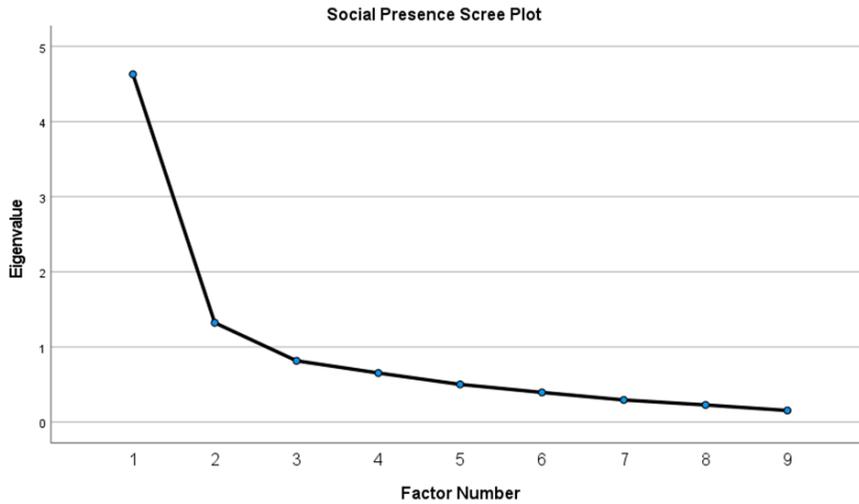


Table E8

This chart shows eigen values over the value of 1 and total variance between factors on the cognitive presence scale. The chart was generated from the preliminary analysis.

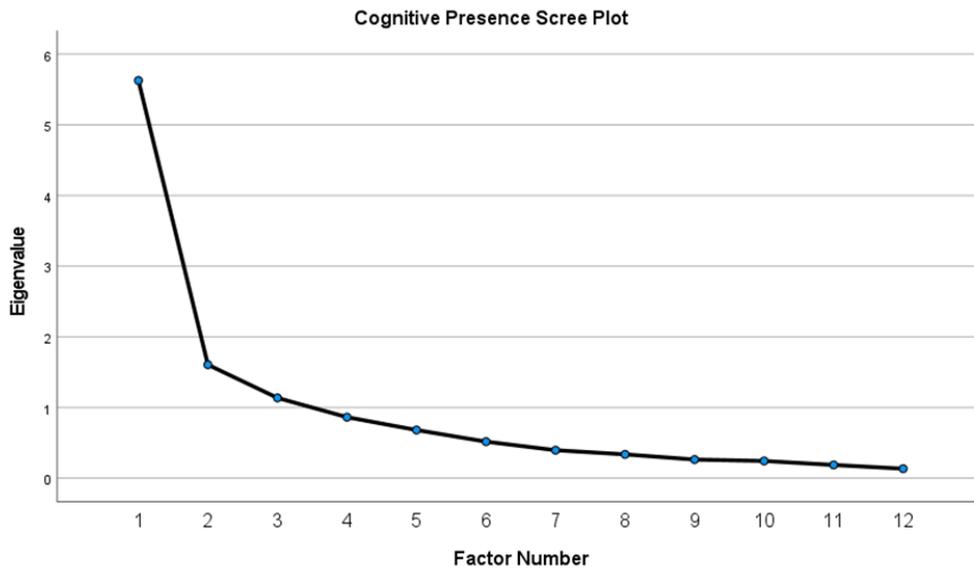
Cognitive Presence Total Variance Explained							
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	5.628	46.899	46.899	5.267	43.891	43.891	4.409
2	1.606	13.381	60.280	1.185	9.873	53.764	3.780
3	1.137	9.474	69.754	.794	6.613	60.377	2.427
4	.864	7.198	76.952				
5	.682	5.685	82.637				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure E9

This is a graph of the initial exploratory factor analysis conducted on cognitive presence scale. Factor loadings are from 2 to 4 factors.



Appendix F

The information provided in this section was provided to the raters before coding the two open ended questions on the Instructors' Perspective of Online Learning Qualtrics survey. The document served as a guide to inform raters on the elements within a COI. The contents were derived from Garrison et al. (1999).

<i>Community of Inquiry Indicators - Training Template</i>					
Elements	Example Indicators (Garrison et al., 2021)	Example Categories (Garrison et al., 2021)	Example Categorized groupings - Positive (successes)	Example Categorized groupings - Negative (challenges)	World-Wide Pandemic (Co-VID 19)
Cognitive Presence	Sense of puzzlement Information exchange Connecting ideas Apply new ideas	Triggering event (discussion prompt) Exploration Integration Resolution	Engagement in academic learning activities that supports student success.	Engagement in academic learning activities that negatively impacts student success.	Referenced Co-VID 19 or Pandemic Specifically
Social Presence	Emotions Risk-free expression Encourage collaboration	Emotional expression Open communication Group cohesion	Engagement in personal non-academic learning activities, which supports student success.	Engagement in personal non-academic learning activities that negatively impacts student success.	Referenced Co-VID 19 or Pandemic Specifically
Teaching Presence	Setting curriculum & methods Sharing personal meaning Focusing discussions	Instructional management Building understanding Direct instruction Providing feedback	Instructor, student, tutor, or others - designing, organizing, providing feedback and direct instruction, and or engaging in learning activities, which supports student success.	The act of an instructor, student, tutor, or other designing, organizing, providing feedback and direct instruction, and or engaging in learning activities, which negatively impacts student success.	Referenced Co-VID 19 or Pandemic Specifically

REFERENCES

- Ajabshir, Z. F. (2019). The effect of synchronous and asynchronous computer-mediated communication (CMC) on EFL learners' pragmatic competence. *Computers in Human Behavior*, 92, 169–177. <https://doi-org.libproxy.txstate.edu/10.1016/j.chb.2018.11.015>
- Akyol, Z., Ice, P., Garrison, R., & Mitchell, R. (2010). The relationship between course socio-epistemological orientations and student perceptions of community of inquiry. *The Internet and Higher Education*, 13(1), 66–68.
- Allen, I. E., Seaman, J., Sloan Consortium, Babson Survey Research Group, & Pearson Foundation. (2013). *Changing course: Ten years of tracking online education in the United States*. Sloan Consortium.
- Almajali, D., Al-Okaily, M., Barakat, S., Al-Zegaier, H., & Dahalin, Z. M. (2022). Students' perceptions of the sustainability of distance learning systems in the post-COVID-19: A qualitative perspective. *Sustainability*, 14(12), N.PAG. <https://doi-org.libproxy.txstate.edu/10.3390/su14127353>
- Almulla, M. A. (2022). Using digital technologies for testing online teaching skills and competencies during the COVID-19 pandemic. *Sustainability*, 14(9), 5455. <https://doi-org.libproxy.txstate.edu/10.3390/su14095455>
- Arbaugh, B., Cleveland-Innes, M., Diaz, S., Garrison, R., Ice, P., Richardson, J., Shea, P., & Swan, K. (2008). Community of inquiry framework: Validation and instrument development. *The International Review of Research in Open and Distributed Learning*, 9(2), 133–136, <https://doi.org/10.19173/irrodl.v9i2.573>

- Armstrong, K. E., Goodboy, A. K., & Shin, M. (2022). Pandemic pedagogy and emergency remote instruction: Transitioning scheduled in-person courses to online diminishes effective teaching and student learning outcomes. *Southern Communication Journal*, 87(1), 56–69. <https://doi-org.libproxy.txstate.edu/10.1080/1041794X.2021.2011954>
- Baggs, R., & Chan, W. W. (2010). Exploration of asynchronous online teaching with a network analysis of class interaction. *2010 IEEE Second International Conference on Social Computing, Social Computing*, 355–362. <https://doi-org.libproxy.txstate.edu/10.1109/SocialCom.2010.58>
- Bailey, T., Jeong, D. W., & Cho, S.-W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, 29(2), 255–270. <https://doi-org.libproxy.txstate.edu/10.1016/j.econedurev.2009.09.002>
- Baldwin, S. J., Ching, Y.-H., & Friesen, N. (2018). Online course design and development among college and university instructors: An analysis using grounded theory. *Online Learning*, 22(2), 157–171.
- Bannink, A. & Dam, J. V. (2021). Teaching via Zoom: Emergent discourse practices and complex footings in the online/offline classroom interface. *Languages*, 6(148), 148. <https://doi-org.libproxy.txstate.edu/10.3390/languages6030148>
- Bozkurt, G. (2017). Social constructivism: Does it succeed in reconciling individual cognition with social teaching and learning practices in mathematics? *Journal of Education and Practice*, 8(3), 210–218.

- Brierton, S., Wilson, E., Kistler, M., Flowers, J., & Jones, D. (2016). A comparison of higher order thinking skills demonstrated in synchronous and asynchronous online college discussion posts. *NACTA Journal*, *60*(1), 14–21.
- Broadbent, J., & Lodge, J. (2021). Use of live chat in higher education to support self-regulated help seeking behaviours: A comparison of online and blended learner perspectives. *International Journal of Educational Technology in Higher Education*, *18*(1). <https://doi-org.libproxy.txstate.edu/10.1186/s41239-021-00253-2>
- Brookfield, S. (2015). *The skillful teacher: on technique, trust, and responsiveness in the classroom* (Third edition). Jossey-Bass.
- Brooks, C. F., & Young, S. L. (2015). Emotion in online college classrooms: Examining the influence of perceived teacher communication behaviour on students' emotional experiences. *Technology, Pedagogy and Education*, *24*(4), 515–527
- Burgess, M., & Caverly, D. C. (2010). Techtalk: An online framework for developmental literacy. *Journal of Developmental Education*, *34*(1), 38–39.
- Cafarella, B. V. (2014). Exploring best practices in developmental math. *Research & Teaching in Developmental Education*, *30*(2), 35–64.
- Cavus, N., Omonayajo, B., & Mutizwa, M. R. (2022). Technology acceptance model and learning management systems: Systematic literature review. *International Journal of Interactive Mobile Technologies*, *17*(23), 109–124.
- Cho, M.-H., & Heron, M. L. (2015). Self-regulated learning: The role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. *Distance Education*, *36*(1), 80–99.

- Churcher, D., Downs, E., & Tewksbury, D. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media use. *The Journal of Effective Teaching*, 14(1), 33-50.
- Coker, H. (2018). Purpose, pedagogy and philosophy: "Being" an online lecturer. *International Review of Research in Open and Distributed Learning*. 19(5), 129-144.
- Colton & Covert (2007). Designing and constructing instruments for social research and evaluation. Jossey-Bass, San Francisco, CA.
- Correia, A-P., Liu, C. & Xu, F. (2020) Evaluating videoconferencing systems for the quality of the educational experience. *Distance Education*, 41(4), 429-452.
doi:10.1080/01587919.2020.1821607
- Creswell, J.W., & Creswell, J.D., (2018). Research Design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications, Inc. 5th ed. Las Angeles, CA.
- Cung, B., Xu, D., Eichhorn, S., & Warschauer, M. (2019). Getting Academically Underprepared Students Ready through College Developmental Education: Does the Course Delivery Format Matter? *American Journal of Distance Education*, 33(3), 178–194.
- Darius, P. S. H., Gundabattini, E., & Solomon, D. G. (2021). A survey on the effectiveness of online teaching–learning methods for university and college students. *Journal of The Institution of Engineers (India): Series B: Electrical, Electronics & Telecommunication and Computer Engineering*, 102(6), 1325–1334. <https://doi-org.libproxy.txstate.edu/10.1007/s40031-021-00581-x>

- DeVellis, R. F. (2003). *Scale Development: Theory and Applications* (Second edition.). SAGE Publications.
- Dintoe, S. S. (2018). Information and communication technology use in higher education: perspectives from faculty. *International Journal of Education and Development Using Information and Communication Technology*, 14(2), 121–166.
- Doo, M. Y., Bonk, C. J., & Heo, H. (2023). Examinations of the relationships between self-efficacy, self-regulation, teaching, cognitive presences, and learning engagement during COVID-19. *Educational Technology Research and Development: A Bi-Monthly Publication of the Association for Educational Communications & Technology*, 1–24.
- Ezra, O., Cohen, A., Bronshtein, A., Gabbay, H., & Baruth, O. (2021). Equity factors during the COVID-19 pandemic: Difficulties in emergency remote teaching through online learning. *Education and Information Technologies: The Official Journal of the IFIP Technical Committee on Education*, 26(6), 7657–7681.
<https://doi-org.libproxy.txstate.edu/10.1007/s10639-021-10632-x>
- Field, A. P. (2013). *Discovering statistics using IBM SPSS statistics: And sex and drugs and rock “n” roll* (Fourth edition.). Sage.
- Francis, M. K., Wormington, S. V. & Hulleman, C. (2019). The costs of online learning: Examining differences in motivation and academic outcomes in online and face-to-face community college developmental mathematics courses. *Frontiers in Psychology*, 10, 1-12.
- Garrison, D. R. (1993). A cognitive constructivist view of distance education: An analysis of teaching-learning assumptions. *Distance Education*, 14(2), 199–211.

- Garrison, D. R., Anderson, T., & Archer, W. (2000). Community of Inquiry Instrument [Database record]. Retrieved from PsycTESTS.
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87–105.
- Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: interaction is not enough. *American Journal of Distance Education*, 19(3), 133–148.
- Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education*, 13(1), 31–36.
- Gibbs, G. R. (2007). *Analyzing Quantitative Data*. SAGE Publications Ltd.
- Graham, D. A. (2019). Benefits of online teaching for face-to-face teaching at historically black colleges and universities. *Online Learning*, 23(1), 144-163.
- Greenhow, C., Graham, C. R., & Koehler, M. J. (2022). Foundations of online learning: Challenges and opportunities. *Educational Psychologist*, 57(3), 131–147.
<https://doi-org.libproxy.txstate.edu/10.1080/00461520.2022.2090364>
- Gurley, L. E. (2018). Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. *Online Learning*, 22(2), 197–220.

- Harrison, R., Hutt, I., Thomas-Varcoe, C., Motteram, G., Else, K., Rawlings, B., & Gemmell, I. (2017). A cross-sectional study to describe academics' confidence, attitudes, and experience of online distance learning in higher education. *Journal of Educators Online*, 14(2).
- Holbeck, R., & Hartman, J. (2018). Efficient strategies for maximizing online student satisfaction: Applying technologies to increase cognitive presence, social presence, and teaching presence. *Journal of Educators Online*, 15(3).
- Horzum, M. B. (2015). Interaction, structure, social presence, and satisfaction in online learning. *Eurasia Journal of Mathematics, Science & Technology Education*, 11(3), 505–512. <https://doi-org.libproxy.txstate.edu/10.12973/eurasia.2014.1324a>
- Hrastinski, S., Keller, C., & Carlsson, S. A. (2010). Design exemplars for synchronous e-learning: A design theory approach. *Computers & Education*, 55(2), 652–662.
- Huang, Q., & Lee, V. W. Y. (2022). Exploring first-year university students' blended learning experiences during the COVID-19 through the community of inquiry model. *The International Journal of Information and Learning Technology*, 39(4), 373–385. <https://doi-org.libproxy.txstate.edu/10.1108/IJILT-02-2022-0024>
- Hurt, N., Moss, G., Bradley, C., Larson, L., Lovelace, M., Prevost, L., & Camus, M. (2012). The Facebook effect: College students' perceptions of online discussions in the age of social networking. *International Journal for the Scholarship of Teaching and Learning*, 6(2), 1-24. doi10.20429/ijstl.2012.060210

- Ironsmith, M., Marva, J., Harju, B., & Eppler, M. (2003). Motivation and performance in college students enrolled in self-paced versus lecture-format remedial mathematics courses. *Journal of Instructional Psychology, 30*(4), 276–284.
- Jaafar, R. (2015). Can group discussions and individualized assignments help more students succeed in developmental mathematics? *Journal of College Teaching & Learning, 12*(3), 209–222.
- Jaggars, S. S., Edgecombe, N., Stacey, G. W., & Columbia University, C. C. R. C. (2013). What we know about online course outcomes. *Research Overview. Community College Research Center, Columbia University.*
- Kass, R. & Tinsley, H. (1979). Factor analysis. *Journal of Leisure Research, 11*(2), 120-138. doi: 10.1080/00222216.1979.11969385
- Kies, J. K., Williges, R. C., & Rosson, M. B. (1997). Evaluating desktop video conferencing for distance learning. *Computers & Education, 28*, 79–91. [https://doi-org.libproxy.txstate.edu/10.1016/S0360-1315\(97\)00004-3](https://doi-org.libproxy.txstate.edu/10.1016/S0360-1315(97)00004-3)
- Kilis, S., & Yildirim, Z. (2018). Investigation of community of inquiry framework in regard to self-regulation, metacognition and motivation. *Computers & Education, 126*, 53–64. <https://doi-org.libproxy.txstate.edu/10.1016/j.compedu.2018.06.032>
- Kim, C., & Hodges, C. B. (2012). Effects of an emotion control treatment on academic emotions, motivation and achievement in an online mathematics course. *Instructional Science, 40*(1), 173-192. doi:10.1007/s11251-011-9165-6
- Lam, J. Y. C. (2015). Autonomy presence in the extended community of inquiry. *International Journal of Continuing Education & Lifelong Learning, 8*(1), 39–61.

- Law, K. M. Y., Geng, S., & Li, T. (2019). Student enrollment, motivation and learning performance in a blended learning environment: The mediating effects of social, teaching, and cognitive presence. *Computers & Education*, 136, 1-12.
- Lee, J.-E., & Recker, M. (2021). The effects of instructors' use of online discussions strategies on student participation and performance in university online introductory mathematics courses. *Computers & Education*, 162. <https://doi-org.libproxy.txstate.edu/10.1016/j.compedu.2020.104084>
- Levy, P. (2003). A methodological framework for practice-based research in networked learning. *Instructional Science*, 31(1/2), 87–109.
- Lewis, K. O., McVay-Dyche, J., Chen, H., & Seto, T. L. (2015). Examining sense of community among medical professionals in an online graduate program. *Journal of Educators Online*, 12(1), 1–29.
- Lowenthal, P. R., & Dunlap, J. C. (2020). Social presence and online discussions: A mixed method investigation, *Distance Education*, 41(4), 490-514, doi:10.1080/01587919.2020.1821603
- MacDonald L. & Caverly D. C. (2000). Techtalk: Synchronous distance developmental education. *Journal of Developmental Education*, 23(3), 38–39.
- Martirosyan, N. M., Kennon, J. L., Saxon, D. P., Edmonson, S. L., & Skidmore, S. T. (2017). Instructional technology practices in developmental education in Texas. *Journal of College Reading & Learning*, 47(1), 3–25.

- Meletiou-Mavrotheris, M., Eteokleous, N., & Stylianou-Georgiou, A. (2022). Emergency remote learning in higher education in Cyprus during COVID-19 lockdown: A zoom-out view of challenges and opportunities for quality online learning. *Education Sciences*, 12(7), 1-34.
- Merriam-Webster (n.d.). Merriam-Webster.com dictionary. Retrieved September 29, 2022, from <https://www.merriam-webster.com/dictionary/synchronous>
- Mirke, E., Cakula, S., & Tzivian, L. (2019). Measuring teachers-as-learners' digital skills and readiness to study online for successful e-learning experience. *Journal of Teacher Education for Sustainability*, 21(2), 5–16. <https://doi-org.libproxy.txstate.edu/10.2478/jtes-2019-0013>
- Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *The Internet and Higher Education*, 14(2), 129–135. <https://doi-org.libproxy.txstate.edu/10.1016/j.iheduc.2010.10.001>
- Nandi, D., Hamilton, M., & Harland, J. (2012). Evaluating the quality of interaction in asynchronous discussion forums in fully online courses. *Distance Education*, 33(1), 5–30. <https://doi-org.libproxy.txstate.edu/10.1080/01587919.2012.667957>
- Natow, R. S., Reddy, V., Grant, M., & Columbia University, C. for the A. of P. R. (CAPR). (2017). How and why higher education institutions use technology in developmental education programming. A CAPR Working Paper. In *Community College Research Center, Teachers College, Columbia University*. Community College Research Center, Teachers College, Columbia University.

- Offenholley, K. (2012) A discourse analysis of the online mathematics classroom. *American Journal of Distance Education*, 26(4), 236-248, DOI:10.1080/08923647.2012.727727
- Oliver, D. (2022). Pedagogical approaches for improving reading compliance and discussion in higher education classrooms. *College Student Journal*, 56(2), 151–167.
- Peterson, C. L., & Caverly, D. C. (2005). Techtalk: Building academic literacy through online discussion forums. *Journal of Developmental Education*, 29(2), 38–39.
- Phelps, A., & Vlachopoulos, D. (2020). Successful transition to synchronous learning environments in distance education: A research on entry-level synchronous facilitator competencies. *Education and Information Technologies: The Official Journal of the IFIP Technical Committee on Education*, 25(3), 1511 -1527.
- Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33–40. <https://doi.org/10.1037/0022-0663.82.1.33>
- Pintrich, P., Smith, D., García, T., & McKeachie, W. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ). Berlin: University of Michigan.
- Potocka, K. (2010). An entirely-online developmental mathematics course: Creation and outcomes. *PRIMUS*, 20(6), 498–516.
- Pregowska, A., Masztalerz, K., Garlinska, M., & Osial, M. (2021). A worldwide journey through distance education--from the post office to virtual, augmented and mixed realities, and education during the COVID-19 pandemic. *Education Sciences*, 11.

- Price, L. R. (2017). *Psychometric methods: theory into practice*. The Guilford Press.
- Ritzhaupt, A. D., Rehman, M., Wilson, M. L., & Ruggles, K. (2022). Exploring the factors associated with undergraduate students' online learning anxiety: Development of the online learner anxiety scale. *Online Learning Journal*, 26(3), 111.
- Richardson, J. C., Koehler, A. A., Besser, E. D., Caskurlu, S., Lim, J., & Mueller, C. M. (2015). Conceptualizing and investigating instructor presence in online learning environments. *International Review of Research in Open and Distributed Learning*, 16(3), 256–297.
- Richardson, J. C., & Lowenthal, P. (2017). Instructor social presence: A neglected component of the community of inquiry. *ELearning & Software for Education*, 2, 531–536.
- Rockinson-Szapkiw, A. J., Wendt, J., Wighting, M., & Nisbet, D. (2016). The Predictive Relationship Among the Community of Inquiry Framework, Perceived Learning and Online, and Graduate Students' Course Grades in Online Synchronous and Asynchronous Courses. *International Review of Research in Open & Distance Learning*, 17(3), 18–34. <https://doi-org.libproxy.txstate.edu/10.19173/irrodl.v17i3.2203>
- Sadaf, A., Kim, S. Y., & Wang, Y. (2021) A comparison of cognitive presence, learning, satisfaction, and academic performance in case-based and non-case-based online discussions. *American Journal of Distance Education*, 35(3), 214-227, doi: 10.1080/08923647.2021.1888667

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3E [Third edition]). SAGE.

Samuel, A., & Conceição, S. C. O. (2022). Using the critical incident questionnaire as a formative evaluation tool to inform online course design: A qualitative study. *International Review of Research in Open and Distributed Learning*, 23(2), 151–169.

Sattler, N. J. (2005). AMATYC members offer their perceptions of interactions that occur in developmental mathematics courses. *AMATYC Review*, 27(1), 62–80.

Scherer, R., Siddiq, F., Howard, S. K., & Tondeur, J. (2023). The more experienced, the better prepared? New evidence on the relation between teachers' experience and their readiness for online teaching and learning. *Computers in Human Behavior*, 139.

Schreiner, L. A., & Louis, M. C. (2011). The engaged learning index: Implications for faculty development. *Journal on Excellence in College Teaching*, 22(1), 5–28.

Shanahan, T. M. (2020). Pedagogical framework for integrating developmental writing and English composition through the accelerated learning program corequisite model. *Journal of Higher Education Theory & Practice*, 20(10), 159–172.

<https://doi-org.libproxy.txstate.edu/10.33423/jhetp.v20i10.3660>

Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster “epistemic engagement” and “cognitive presence” in online education. *Computers and Education*, 52, 543-553.

- Shea, R., Richardson, J. & Swan, K. (2022) Building bridges to advance the community of inquiry framework for online learning. *Educational Psychologist*, 57(3), 148-161. doi: 10.1080/00461520.2022.2089989
- Spence, D. J., & Usher, E. L. (2007). Engagement with mathematics courseware in traditional and online remedial learning environments: Relationship to self-efficacy and achievement. *Journal of Educational Computing Research*, 37(3), 267-288–288. <https://doi-org.libproxy.txstate.edu/10.2190/EC.37.3.c>
- Spinks, M., Metzler, M., Kluge, S., Langdon, J., Gurvitch, R., Smitherman, M., Esmat, T., Bhattacharya, S., Carruth, L., Crowther, K., Denton, R., Edwards, O. V., Shrikhande, M., & Strong-Green, A. (2021). “This wasn’t pedagogy, it was panicgogy”: Perspectives of the challenges faced by students and instructors during the emergency transition to remote learning due to COVID-19. *College Teaching*, 1–17. <https://doi-org.libproxy.txstate.edu/10.1080/87567555.2021.2018395>
- Spradlin, K., & Ackerman, B. (2010). The effectiveness of computer assisted instruction in developmental mathematics. *Journal of Developmental Education*, 24(2), 12-42.
- Stadler, D., & O’Reilly, M. A. (2021). Student engagement with online course content at a two-year college. *Journal of Library & Information Services in Distance Learning*, 15(3), 170–186.
- Stine, L. (2010). Basically unheard: Developmental writers and the conversation on online learning. *Teaching English in the Two-Year College*, 38(2), 132–148.

- Stuart, J., O'Donnell, A. W., Scott, R., O'Donnell, K., Lund, R., & Barber, B. (2022). Asynchronous and synchronous remote teaching and academic outcomes during COVID-19. *Distance Education*, 43(3), 408–425. <https://doi-org.libproxy.txstate.edu/10.1080/01587919.2022.2088477>
- Tabvuma, V., Carter-Rogers, K., Brophy, T., Smith, S. M., & Sutherland, S. (2021). Transitioning from in person to online learning during a pandemic: an experimental study of the impact of time management training. *Higher Education Research & Development*.
- Tan, H. (2022). Influence of teachers' effective teaching behavior on knowledge transfer of students in online teaching. *International Journal of Emerging Technologies in Learning*, 17(09), 228-240.
- Taylor, J. M. (2008). The effects of a computerized algebra program on mathematics achievement of college and university freshman enrolled in a developmental mathematics course. *Journal of College Reading and Learning*. 39(1), 35-53.
- Thomas, R. A., West, R. E., & Borup, J. (2017). An analysis of instructor social presence in online text and asynchronous video feedback comments. *The Internet and Higher Education*, 33, 61–73. <https://doi-org.libproxy.txstate.edu/10.1016/j.iheduc.2017.01.003>
- Trenholm, S. (2009). A study on the efficacy of computer-mediated developmental math instruction for traditional community college students. *Research and Teaching in Developmental Education*, 25(2), 68–76. Retrieved from <http://www.jstor.org>

- Van Braak, M., Huiskes, M., & Veen, M. (2022). When and how teachers intervene in group discussions on experiences from practice in postgraduate medical education: an interactional analysis. *Advances in Health Sciences Education: Theory and Practice*, 1–24. <https://doi-org.libproxy.txstate.edu/10.1007/s10459-022-10122w>
- Weinkle, L. J., Stratford, J. M., & Lee, L. M. J. (2020). Voice in digital education: The impact of instructor's perceived age and gender on student learning and evaluation. *Anatomical Sciences Education*, 13(1), 59–70.
- Wise, A., Chang, J., Duffy, T., & Del Valle, R. (2004). The effects of teacher social presence on student satisfaction, engagement, and learning. *Journal of Educational Computing Research*, 31(3), 247-271–271.
- Wladis, C., Offenholley, K. & George, M. (2014). Leveraging technology to improve developmental mathematics course completion: Evaluation of a large scale intervention. *Community College Journal of Research and Practice*, 38(2), 1083-1096. DOI: 10.1080/10668926.2012.745100
- Yukselturk, E., & Yildirim, Z. (2008). Investigation of interaction, online support, course structure and flexibility as the contributing factors to students' satisfaction in an online certificate program. *Journal of Educational Technology & Society*, 11(4), 51–65.
- Zavarella, C. A., & Ignash, J. M. (2009). Instructional delivery in developmental mathematics: Impact on retention. *Journal of Developmental Education*. 3(2), 2-13. Retrieved from <http://www.jstor.org>

- Zhang, R. & Mercado, T. (2023). Do zoom meetings really help? A comparative analysis of synchronous and asynchronous online learning during Covid-19 pandemic. *Journal of Computer Assisted Learning*, 39(1), 210–217. <https://doi-org.libproxy.txstate.edu/10.1111/jcal.12740>
- Zhang, Y., Tian, Y., Yao, L., Duan, C., Sun, X., & Niu, G. (2022). Teaching presence predicts cyberloafing during online learning: From the perspective of the community of inquiry framework and social learning theory. *British Journal of Educational Psychology*, 92(4), 1651–1666. <https://doi-org.libproxy.txstate.edu/10.1111/bjep.12531>
- Zohrabi, M. (2013). Mixed methods research: Instrument, validity, reliability and reporting findings. *Theory and Practice in Language Studies*, 3(2), 254-262. doi: 10.4304/tpls.3.2.254-262
- Zydney, J. M., deNoyelles, A., & Kyeong-Ju Seo, K. (2012). Creating a community of inquiry in online environments: An exploratory study on the effect of a protocol on interactions within asynchronous discussions. *Computers & Education*, 58, 77–87.