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I am submitting herewith a dissertation written by Andrea Lucia Arce-Trigatti entitled "UNDERSTANDING THE ROLE OF POWER IN INTERDISCIPLINARY, UNDERGRADUATE, STUDENT TEAMS: A CRITICAL DISCOURSE ANALYSIS." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

Barbara J. Thayer-Bacon, Major Professor

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

**UNDERSTANDING THE ROLE OF POWER IN INTERDISCIPLINARY,
UNDERGRADUATE, STUDENT TEAMS:
A CRITICAL DISCOURSE ANALYSIS**

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Andrea Lucia Arce-Trigatti
May 2018

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*Esta disertación está dedicada a mis padres,
mis primeros maestros,
los cuales han dedicado la mayor parte de su vida como docentes,
y que siempre inspiran a gozar el aprendizaje.*

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Throughout this process, I have been blessed with array of mentors, within and outside of academia, that have been instrumental in shaping various facets of this work. Although words do not do justice in expressing the depth of the influence, guidance, and support provided by these individuals, this is my attempt to acknowledge such actions and reflect on this dissertation as a product of continued engagement with these wonderful minds.

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¹ These individuals must remain anonymous to protect the confidentiality of the students represented in the data for this dissertation.

throughout this semester. This is a truly amazing team to be a part of and I am looking forward to all of our continued and future research endeavors.

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queridas creaturas de cuatro patas, y todos los que guardo en mi corazón – mil gracias por tu constante apoyo.

ABSTRACT

This dissertation is a cultural studies project that aims to understand how power manifests and influences knowledge construction between students working in an undergraduate, interdisciplinary, collaborative learning environment. Power – which holds the potential to empower and/or silence students - is intrinsic in social interaction and therefore inherent in collaboration. Exploring how power influences new knowledge construction in undergraduate, collaborative learning environments has the potential to uncover what type of interactions are valued and integrated or marginalized and excluded as part of these communicative exchanges.

The purpose of this dissertation is thus not only to improve student learning within collaborative contexts, but also to further the implications to teaching that could help advance interdisciplinary communication and new knowledge construction. To explore these dynamics, a two part analysis employing James Gee's approach to *critical discourse analysis* was applied to archival data collected from an undergraduate interdisciplinary course entitled, Clinical Immersion at Disciplinary Interfaces (CIDI). This unique, interdisciplinary course required teams composed of chemical engineering and nursing students to develop a prototype of innovative technology that addressed real-world problems in the healthcare profession.

The findings emphasize that the manifestation of power and its influence on knowledge construction was primarily accomplished via students' association with a specific disciplinary *cultural model*. The affiliation to a specific disciplinary cultural model determined several of the ways in which students engaged within particular social contexts embedded within the CIDI course including: how they positioned themselves (as either insiders or outsiders within that space); their expectations regarding how they understood that space and made *situated meanings*; and ultimately, their perceived ability to contribute within that space based on their fluency of

the associated *social language* or *Discourses*. Utilizing a cultural studies lens, scholarship from this field of study is integrated to emphasize how manifestations of power impacted the context of the CIDI course in three ways: through space, language, and disciplinary beliefs. Five pedagogical implications are underscored as part of the concluding remarks.

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LIST OF ABBREVIATIONS

ABET	Accreditation Board of Engineering and Technology
CAT	Critical Assessment Test
CCNA	Commission on Collegiate Nursing Education Accreditation
CDA	Critical Discourse Analysis
<i>cda</i>	<i>critical discourse analysis</i>
CIDI	Clinical Immersion at Disciplinary Interfaces
COE	College of Engineering
CNA	Certified Nursing Assistant
CVICU	Cardiovascular Intensive Care Unit
GPA	Grade Point Average
IRB	Institutional Review Board
KA	Knowledge Acquisition
KT	Knowledge Transfer
LES	Linear Engineering Sequence
NAE	National Academy of Engineering
NAS	National Academy of Science
NG	Nasogastric Intubation
NRC	National Research Council
RN	Registered Nurse

CHAPTER 1

SETTING THE STAGE:

INTRODUCING KEY CONTEXTUAL AND BACKGROUND INFORMATION

Introduction

Collaboration is a student-centered learning strategy that leverages interaction to not only make courses more engaging but also to enhance knowledge construction processes developed through such exchanges (Brooks, 2013; Felder & Brent, 2015). Scholarship denotes that new knowledge construction is seldom a solitary act as a myriad of social factors often influence the connections made to inspire innovative ideation (Anderson, 2013; Paulus & Nijstad, 2003). The argument then follows that regardless of if an individual works alone to make new connection, the context in which they work and live is encased in a web of social structures, networks, norms, and values that impact the tools utilized to view, interpret, and analyze the world in which they live (Anderson, 2013; Larson & Lockee, 2014; Shayer, 2003). It can then be concluded that social context - and increased interaction within such context - matters significantly as it influences individual thinking, understanding, and ultimately learning. The benefits of collaborative learning environments are therefore encompassed in how they harness this social potential and direct such interaction to enhance learning geared towards a specific objective.

Some would argue this is an idyllic conceptualization of collaboration, as there is evidence that collaborative efforts in any context are fraught with issues. In the case of undergraduate educational settings, for example, despite the several evidence-based benefits associated with such interactions (e.g., increased self-esteem, higher levels of achievement and understanding, stronger interpersonal skills), educators and students alike have voiced preference

for implementing lesson plans where students work alone (Alderman, 2004; Felder & Brent, 2015; Putnam, 1998). Felder and Brent (2015) even quipped that the average undergraduate instructor might prefer avoiding collaborative assignments altogether in lieu of dealing with a, “parade of dysfunctional groups and unhappy team members” (p. 245). What this frustration points to is the reality that effective collaboration is not simply about putting students together and hoping for the best. In reality, collaboration is a social endeavor that is intricate and complex, embodying a multifaceted approach to learning in which those involved are required to be active and the environment engaging (Anderson, 2013; Fredrickson, Dunlap, McMahan, 2013; Putnam, 1998). In leveraging social interaction, all must become facilitators of learning hoping to facilitate communication that leads to knowledge construction. At a deeper level, this complexity points to the significance of understanding the role that underlying social dynamics (e.g., power, socially-constructed identities, norms, and values) play in communicative exchanges, language formations, and new knowledge construction (Brooks, 2013; Putnam, 1998; Rogers, 2004).

If all of these elements are taken into account, designing and implementing an undergraduate collaborative learning environment becomes an incredibly intricate feat. I became witness to this process in my role as a research consultant for an interdisciplinary group of scholars working in a public, Southeastern, four-year university. Two of the scholars – a professor of chemical engineering and a professor of nursing - were awarded the opportunity via an educational design grant to create an interdisciplinary clinical immersion course entitled Clinical Immersion at Disciplinary Interfaces (CIDI) that centers on healthcare issues at the intersection of both disciplines. The curricular design of the course is inherently collaborative as undergraduate students must work in interdisciplinary teams representing both disciplines to

create a prototype of innovative technology that addresses a healthcare challenge identified within their clinical immersion experiences (Arce et al., 2015; Sanders & Geist, 2016). As an invited research consultant for the course, I was able to observe both professors as they became facilitators for the student teams throughout the course of a semester. Throughout this process I saw how the initial design of the course translated into implementation and influenced how students navigated their collaborative efforts.

This experience provided a vivid context for which to apply what I was learning as part of my doctoral program in Learning Environments and Educational Studies (LEEDS) at the University of Tennessee. In this program I have been privileged to better my understanding of the complexity of collaboration through three different lenses - cultural studies, educational psychology, instructional design - each which delineates its own scholarship and approach to collaboration. As my core concentration, cultural studies has afforded me a comprehensive framework in which to analyze collaboration through a critical lens. Cultural studies scholars have underscored that work representative of this field is linked by a core interest in the production of knowledge as a political practice; such work pioneers research at the interface of power, culture, identity, knowledge, authority, and meaning (Barker, 2012; Hytten, 1997). To further this point, Hytten (1997) argues, “power is a central concept in cultural studies,” and exploring this issue within and across various relations of power is, “perhaps the key theme of the movement” (p. 42). Cultural studies projects thus attempt to uncover power dynamics that influence the formation of cultural norms and activities via knowledge production that, in turn, leads to and reproduces social asymmetry (Barker, 2012; Hytten, 1997; Wright, 1996).

When applied to an educational context, cultural studies provides a space in which to challenge and better pedagogical strategies through the study of underlying student power

dynamics. To clarify, better understanding of how power influences new knowledge construction in undergraduate collaborative learning environments has the potential to uncover what type of interactions are valued and integrated or marginalized and excluded as part of these communicative exchanges (Hyttén, 1997). Power – which holds the potential to empower or silence students - is an inherent element in social interaction and therefore also part of collaboration (Barker, 2012; Thayer-Bacon, 2000). It is not necessarily a fixed force, but rather an action or relation that implicates growth (Foucault, 1972, 1980, 1981). Within collaborative exchanges it can influence students' engagement with or withdrawal from the conversation (Foucault, 1980). Issues of power are, however, little addressed in pedagogical manuals on teaching and learning practices geared towards facilitating collaboration at the undergraduate level (Barkley, Cross, & Major, 2005; Brooks, 2013; Felder & Brent, 2015).

I therefore propose that this dissertation is inherently a cultural studies project which aims to explore how power manifests in the social interactions of undergraduate students working in a collaborative learning environment. Specifically, I want to use the aforementioned CIDI course - an interdisciplinary, collaborative context at the undergraduate level – as my main contextual setting for this exploration. The purpose of this investigation is not only to improve student learning within this context, but also to further the implications to teaching that could help advance interdisciplinary communication, and thus, new knowledge construction. In accordance, the inspiration for this dissertation is rooted in a desire to comprehend how power is constructed within undergraduate student exchanges and, in turn, influences students' abilities to work together to form innovative connections in a new field.

In the remainder of this chapter I attempt to set the stage for the rest of this dissertation by introducing several elements relevant to the development and comprehension of this research.

I start by presenting my personal motivation for pursuing this type of research, specifically my own association of better understanding student dynamics within a collaborative learning environment with its connection to issues of diversity. I then introduce the contextual framework for this dissertation by providing an overview of the CIDI course as the source of my investigation. In doing so, I present the purpose and structure of the course, its pedagogical platform, and the learning assumptions associated with this platform including constructivist theories, collaboration, and communication. As this is meant to be a brief introduction to the contextual framework, more details pertaining to the course are presented in chapter four as part of the thick description of the data. I then introduce this dissertation's research design, explicate why this is a cultural studies project, and thoroughly detail the conceptual and analytical framework (i.e., *critical discourse analysis (cda)* and Gee's (2004) approach to *cda* respectively) in which this research is rooted.² This chapter concludes with a roadmap of the remaining chapters to help organize the structure for the entirety of this work.

² The framing of *critical discourse analysis* in this dissertation is inspired by Rogers' (2004) work on the application of this method to educational research. In this work, she clarifies that the field has been referenced in three different forms: in capitalized form, in lower-case form, and as *critical approaches to discourse analysis* (Rogers, 2004). In its capitalized form, Critical Discourse Analysis (CDA) refers to a research program associated with the work of Norman Fairclough which features a specific three-part method to conducting this type of analysis (Rogers, 2004, p. x). In its lower case form, *critical discourse analysis (cda)* refers to a variety of theories and methods utilized to perform critical inquiry into language practices (Rogers, 2004, p. 2). Others, including James Gee, argue that all analysis of language is inherently critical

A Personal Interest in Collaboration

Intimately linked to the significance of this dissertation is the notion that diverse ideas enrich learning. As an educator, my work has led me to become a mentor to minority and international student populations as they progress through various phases of their own academic journeys; their experiences inspire me to conduct research projects that intersect various disciplines and social, cultural, and political spheres. I am therefore cognizant that one perspective rarely provides an accurate picture of an individual experience and the meanings and interpretation therein derived. This notion is linked to the value of diversity and a *relational* view of knowledge – wherein group memberships (e.g., gender, class, race, *inter alia*) generate different relationships with regard to how knowledge is produced and generated (Hurtado, 1998; Thayer-Bacon, 2000). I thus entered into my doctoral program with an agenda: to better understand the pedagogical methods that help create a learning space where *all* students can appreciate and learn from their unique perspectives and that of their peers. In following this pursuit I found my academic home in cultural studies in education studying collaborative learning environments.

and therefore the varying methods are more *critical approaches to discourse analysis* (Rogers, 2004, p. 2). Rogers (2004) argues that for applying these techniques to educational research it is more advantageous to use the more inclusive terms (i.e., *cda* or *critical approaches to discourse analysis*) as such research often combines multiple theories and practices to perform critical analysis on discursive data. For this dissertation, I will be following this advice and utilizing *cda* as it is more inclusive and encompasses Gee's (2004) own understanding of how his work fits into the larger New Literacy Studies movement. When not in italics, critical discourse analysis is referring to the actual analysis.

Hytten (1997) describes the application of cultural studies to pedagogy as a process of connecting academic theory to practice and experience thereby enabling scholars to make impactful change. This dissertation is therefore inspired by the potential offered by collaboration as empowering to those working in these spaces at the undergraduate level. Collaborative learning aligns well with my belief that students' perspectives should be incorporated into discussions, assignments, and projects as a way to enhance their learning. From my understanding of critical social theory work, power is one of the main social features that make student collaboration not only dynamic but also interesting. Subtle power dynamics that are embedded within social contexts, traditions, and behaviors in turn influence student agency, their interpersonal communication, and, effectively, their learning (Anderson, 2013; Foucault, 1980; Gee, 2008). The rationale for why I was drawn to research that focused on advancing the pedagogy in this area stems from acknowledging the benefits of studying issues of power as a way to leverage such dynamics and enrich collaborative learning by fostering positive interaction among students.

Setting the Stage

A Brief Introduction to the CIDI Course

The first iteration of the CIDI course was implemented at a public, Southeastern, four-year university and was offered in the fall 2015 semester.³ As noted, this course was created by two faculty members (representing the fields of chemical engineering and nursing) interested in exploring the innovative potential of teaching students within an interdisciplinary format centered on advancing the field of healthcare. Although several learning strategies are integrated

³ The name of the university will remain confidential in order to protect the confidentiality of the student voices captured in the archival data used in this study.

throughout the course, the course is fundamentally rooted in the core pedagogical tenants embodied by the Renaissance Foundry (herein the Foundry Model) and the Legacy Cycle (Arce et al., 2015; Klein & Harris, 2007; Sanders & Geist, 2016). The Foundry Model is a pedagogical platform developed by an interdisciplinary research team at this same institution that emphasizes a learning strategy which implements an iterative approach to both knowledge acquisition and knowledge transfer (Arce et al., 2015; Sanders & Geist, 2016). In courses that adopt the Foundry Model, students must work in a collaborative learning environment to move through six pedagogical steps that begin with the identification of a challenge and end with the development of a prototype of innovative technology (Arce et al., 2015). All of the collaborative elements of the CIDI course are developed from this learning platform (Arce et al., 2015; Sanders & Geist, 2016). In turn, the Legacy Cycle is a problem-based learning strategy that has influenced several of the critical thinking aspects of the course (Klein & Harris, 2007; Sanders & Geist, 2016). As students are asked to move through the clinical immersion and design phases of the course, the instructors equip students with the six steps of the cycle as a model of thinking through their challenge: that is, they must illustrate how they are generating ideas, integrating multiple perspectives, researching and revising their design, testing, and finally going public with their prototype of innovative technology (Arce et al., 2015; Klein & Harris, 2007; Sanders & Geist, 2016).

The logistics of this course are also purposeful. At the beginning of the semester, enrolled students are intentionally placed in interdisciplinary student teams composed of students representing both disciplines. They then move through three phases of the course within their teams: orientation, clinical immersion, and design. In the first phase, orientation, students must educate each other on their disciplinary training and how they understand biomedical and

healthcare problems. The next phase, clinical immersion, tasks the teams with completing four clinically based experiences in local hospitals, clinics, or device laboratories. It is here that they must identify a healthcare challenge that will be addressed in the next phase. Two classroom sessions are integrated into this phase to help teams work through communication dynamics and learn skills associated with the Legacy Cycle. In the final design phase, student teams are left to work towards creating a prototype of innovative technology which addresses the healthcare challenge identified in the prior phase (Arce et al., 2015). Although facilitators are always available to help students think through their design, student teams are generally left on their own to move the project forward. Resources available to students here include: the university's MakerSpace (a space dedicated to prototyping and modeling which houses various resources like 3D printers, laser cutters, and advanced digital software); the nursing and chemical engineering laboratories; and faculty, graduate assistants, and outside community members (e.g., industry leaders from both fields, student mentors, and administrative staff) (Dougherty, 2012; Halverson & Sheridan, 2014; Martin, 2015). The course culminates with a presentation of the prototype of technologies to members of the community (Arce et al., 2015; Sanders & Geist, 2016).⁴

How Does Power Come into Play?

Coming from a cultural studies perspective, I was curious to understand how power could be conceptualized in a collaborative learning environment such as this one. I noted that despite the efficacy of the pedagogical techniques utilized to mitigate specific points of observable contention that might result from collaborative interactions (i.e., effective group dynamic

⁴ More details pertaining to purpose, design, and postsecondary context in which this course was developed will be presented in chapter four of this dissertation as part of the thick description of the contextual framework from which the archival data for this dissertation was collected.

strategies and communication practices rooted in social constructivism learning theories) these techniques were not necessarily designed to recognize the role of power within these exchanges. Power, described as both a constraining and enabling force, influences all social relations and often permeates students' discursive practices long before they enter the classroom (Anderson, 2013; Barker, 2012). In consequence, power impacts how individuals interact, communicate, and ultimately build knowledge with one another (Foucault, 1980, 1982). Regarding pedagogy and learning, power may therefore mitigate not only what type of knowledge is privileged in these interactions but the levels of agency students believe to have to contribute to the conversation (Giroux, 1997; Shapiro, 2013).

In the CIDI course, student interaction is central to achieving the objectives of the course: new knowledge construction in the form of a prototype of innovation technology (Arce et al., 2015; Sanders & Geist, 2016). I posit that power plays an influential role in the type of new knowledge construction that is occurring between students as they exchange ideas as members of their respective, interdisciplinary teams, however its role is not necessarily transparent. Wherein the overall design of the CIDI course influences the activities of these student teams within the progression of the course, the discursive exchanges that lead to actual new knowledge construction are representations of what is occurring between the students as they engage in these collaborative activities. As the students represent specific disciplines within their groups, and these disciplines, in turn, are associated with traditional social roles, norms, and traditions that intersection personal social contextual markers (e.g., race, gender, ethnicity, sexual orientation) is it possible that the power dynamics which influence these socio-cultural factors are weighing in on the type of exchanges developed between these team members (Gee, 2004; Rogers, 2004)? Effectively, we know that the CIDI course is intended to achieve new

knowledge construction overall, but are the successes of the pedagogical structure of the course also being translated into the student interaction that is occurring throughout the course? That is, are the student discursive formations reflective of an integration of unique, student perspectives or are certain perspectives being valued over others therefore forfeiting the pedagogical platform of the course? The pith of these questions focuses on understanding the role of power in the language, communication patterns, and discursive formations produced by students in this course.

The Research Design

The objective of this dissertation is to explore how power manifests in the experiences and observations offered by students enrolled in a collaborative learning course at the undergraduate level (i.e., the CIDI course) through reflections captured in archival data collected from this course. Conceptualized as a primarily descriptive study, I aim to examine these experiences and observations by applying critical discourse analysis to the discursive practices recorded as part of these reflections in archival data from this course. The following questions guide this dissertation:

- 1) How does power manifest in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?
- 2) What is the role of power concerning new knowledge construction as reflected in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?

With this study I propose to better understand the underlying factors related to power and help identify where, if possible, pedagogical support can help to enhance positive power influences or alleviate asymmetrical power dynamics that may impede new knowledge construction based in student interaction. I propose using the CIDI course as a contextual framework for this dissertation as this course provides a unique collaborative learning environment in which to analyze the interaction of two distinct disciplines – chemical engineering and nursing. For data, I utilize archival data in the form of focus group transcripts and debriefing notes that comprise part of a larger secondary database from the CIDI course. This archival data provides a paradigmatic scenario for investigating the pedagogical implications intertwined in the dynamics of power and discourse as the data represents reflections based on students' experiences and observations within the context of an interdisciplinary learning environment at the undergraduate level. Due to the nature of the data being utilized for this dissertation, this study is bounded to the experiences and observations offered by students in the course as recorded in the archival data being used.

I label this dissertation a cultural studies project as I am centering on a complex, educational issue that requires a critical approach in which to study social issues impacting student interactions, identity, power and discourse. Three theories adopted by cultural studies scholars are relevant for the conceptualization of the theoretical concepts for this dissertation: post-structuralism, anti-essentialism, and postmodernism. I use *critical discourse analysis (cda)* as my conceptual framework as it is aligned with the cultural studies and critical social theory traditions influencing this research, it adopts a postmodern standpoint of discourse, and it integrates specific theoretical tools for analyzing the social dimensions of language (Gee, 2004; Rogers, 2004). James Gee's (2004, 2008) approach to *cda* encompassing his *Seven Building*

Tasks and Theoretical Tools of Inquiry (i.e., *Discourses, social languages, situated meanings, figured world/cultural models*) provides the analytical framework. The resulting critical discourse analysis mirrors these two stages: the first stage utilizes Braun and Clarke's (2006) six-phase thematic analysis model to identify themes in archival data tagged with Gee's (2004, 2008) Seven Building Tasks; the second then analyzes these themes through his Theoretical Tools of Inquiry to situate these patterns within the larger, social context of the CIDI course.⁵ Using Gee's (2004) approach to *cda* coupled with Braun and Clarke's (2006) guide for thematic analysis will identify themes related to power dynamics inherent in the interactions of students enrolled in the CIDI course that can then be connected via theory to these students' social realities. The remainder of this chapter will focus on detailing all of these theories, frameworks, and theoretical tools as they comprise the foundation for this dissertation.

What is Cultural Studies?

Cultural studies as a field is described as anti-disciplinary, multi-disciplinary, inter-disciplinary, and post-disciplinary (Barker, 2012; Wright, 1996). This description stems from

⁵ Rogers (2004) suggests that most socio-cultural approaches to *cda* (like Gee's approach) need to be combined with specific steps with which to engage with discourse in order to apply theory to textual analysis. For this purpose, I combine the analytical framework for this dissertation with Braun and Clarke's (2006) guide to thematic analysis as it provides a six-phase model to help researchers engage with text-based data. These steps are: familiarization, coding, defining, reviewing and refining, evaluating, and reporting (Braun & Clark, 2006). The analytical framework provided by Gee's (2004) approach to *cda* will, in turn, offer a connection between critical social theory and the way this text is analyzed. The specific application of both to the archival data for this work will be presented in chapter three.

the fact that its scholarship combines the approaches of several traditional disciplines (multi- and inter- disciplinary), critiques the limitations of these disciplines (anti-disciplinary), and expands and blurs the boundaries between itself and other demarcated fields (post-disciplinary) (Barker, 2012; Hall, 1980; Schulman & Mason, 1993; Wright, 1996). The resistance of cultural studies scholars to be categorized into a traditional academic discipline has led to the characterization of cultural studies as a practice, cultural form, or intellectual tradition (Steedman, 1993). Wright (1996) furthers this conviction by positing that cultural studies research could also be considered “intellectual activism” rooted in theory (p. 1). The idea of cultural studies being a form of intellectual activism as it regards education and pedagogical scholarship is of particular intrigue as it offers the flexibility and space needed to advance and improve overall student learning experiences. This is, in part, because educational scholarship centers on increasingly complex and multifaceted subjects (e.g., epistemology, learning, social context in learning) that incorporate even more complex players (e.g., students, teacher, administrators all situated in unique historical, social, and political contexts).

Despite the resistance to being placed in a silo by traditional disciplinary boundaries and methods, Wright (1996) offers specific characteristics of cultural studies work that help to define an undefinable study. These characteristics are useful in that because cultural studies is continually evolving and therefore evokes no need to be defined in a certain way, there exist at least some guidelines that encompass what it means to engage in a cultural studies project. Perhaps the most salient of these characteristics can be broadly categorized in how they relate to theory, methods, and focus. Regarding theory, Wright (1996) suggests that cultural studies is both informed by and creative of theory and should be *praxis* driven in that it combines both theory and practice. With regards to methods, cultural studies research must be flexible and

interdisciplinary as each project is unique and can be explored through varying lenses; in turn, there is no one cultural studies method that can be applied to multiple contexts and therefore no creation or endorsement of one canon (Wright, 1996). The methods used to achieve cultural studies projects are to be treated as necessarily transient and subject to negotiation, revision, and even rejection (Wright, 1996). Finally, cultural studies research focuses on issues of power (i.e., how it is negotiated, created, maintained) and are considered inherently concerned with social justice (i.e., each project addresses imbalances which can be uncovered and challenged) (Wright, 1996). As part of both of these foci, cultural studies research also integrates critical reflection with regards to identity and subjectivity and therefore deals with issues of diversity and social difference as they relate to power dynamics and social justice (Wright, 1996, pp. 3-4).

Understanding the historical origin of cultural studies also provides an avenue by which to highlight the purpose of such research. As an academic field, the contested Euro-western origin of cultural studies within academia is regarded as the Birmingham Centre for Contemporary Cultural Studies (hereafter the Centre), established in Great Britain in 1964 (Hyttén, 1997; Steedman, 1993; Wright, 1996). The Centre grew as a product of an evolutionary time in which traditional scholars in the department of English began to place importance on the study of culture (i.e., how it is constructed, transmitted, contested, negotiated, and received) via a flexible interpretation of culture as ordinary, based on lived experiences, an expression of social relations, and understood through the representations and practices of daily life (Barker, 2012; Hyttén, 1997; Wright, 1996). Founding Centre scholars Richard Hoggart, Stuart Hall, Raymond Williams, and E. P. Thompson further argued for a broader understanding of the impact of texts (e.g., aural, visual, and print materials), narratives, and discursive practices and norms on the construction of everyday social and cultural exchanges (Hall, 1980; Hyttén, 1997). Although

cultural studies scholars are hesitant to define the field lest it be condemned to being subjugated to the traditional disciplinary norms it is attempting to decenter, Hytten (1997) offers that there exist four central assumptions that are inherent in cultural studies projects. These include: culture is a dynamic process, there exist no absolute distinctions between high-brow and popular culture, the study of culture must transcend disciplinary boundaries, and culture and power are significantly linked (Hytten, 1997, p. 41). Moreover, the initial scholarship that grew from the Centre was influenced by a Marxist and Gramscian interpretation of society which incorporates these themes and highlights the ideological nature of power and how it influences the struggles endemic within a socially constructed reality, identity politics and social experiences (Barker, 2012; Hall, 1980, 1996).

As noted by Wright's (1996) characterization of the focus of cultural studies projects, power is thus central to this type of research. It is understood as both an enabling and containing force that pervades every level of social interaction; an imbalance of such power is implicit in social justice issues (Barker, 2012; Hall, 1993; Hytten, 1997). Cultural studies research centers on studying such power struggles as it manifests in the ideological dynamics that influence cultural forms and their meaning in society (Hall, 1980, 1996). Its emphasis on uncovering power, and its characteristic use of critical social theory as a tool for such research, is what distinguishes cultural studies from more traditional disciplines like cultural anthropology or multicultural studies (Barker, 2012; Hytten, 1997). Hytten (1997) offers the following synopsis of cultural studies research:

Fundamentally, cultural studies is about investigating the connections between culture, power, knowledge, authority, and meaning. It is both a critical project and a political

project. Critically, cultural studies aims to interrogate the power dynamics which structure how particular cultural symbols, artifacts, forms, and practices get valued and deemed important and worthy, and conversely, who and what gets marginalized in the process. Politically, cultural studies begins with a commitment to disempowered populations and to the idea that academic work should make a difference in the world. (p. 41)

Cultural studies scholars thus emphasize the practicality of this type of research in the form of critical analyses that offer purposefully transformative guidelines that are aimed at advancing social change through social justice (Hyttén, 1997; Wright, 1996).

A Cultural Studies Project

Prior to delineating the conceptual framework for this project, I believe it beneficial to explain how I conceptualize this dissertation as representative of cultural studies scholarship. I begin with Hyttén's (1997) four central themes to describe cultural studies scholarship: culture is a dynamic process, there exist no absolute distinctions between high-brow and popular culture, the study of culture must transcend disciplinary boundaries, and culture and power are significantly linked (p. 41). For this dissertation these themes apply to the undergraduate collaborative context I wish to study (i.e., the CIDI course) as follows. Within this dissertation I define culture as the specific norms, practices, and exchanges developed between the undergraduate students of two distinct disciplines working together in the CIDI course and argue that these elements comprise an inherently dynamic process. This emphasizes what some scholars call the *ordinariness* of culture which celebrates individual capacity to construct shared, meaningful practices as conducive to the formation of culture (Barker, 2012, p. 15). As there are

no distinctions between high-brow and popular culture, the undergraduate student dynamics created within the context of the CIDI course and their subsequent values must be appreciated as part of the culture of this environment. As culture is multifaceted and cannot be studied within the confines of one discipline, I contend that this dissertation will take one interdisciplinary approach (i.e., Gee's [2004] approach to *cda*) that combines formal and functional linguistic and structural methods, cognitive sciences, postmodern literacy theory, and critical social theories to understand the central research objective. Finally, as cultural studies projects argue that culture and power are linked, I too argue that power influences the exchanges that take place as part of this collaborative context and thus the culture that has developed between the interdisciplinary student teams enrolled in this course.

This conceptualization of culture within the CIDI course relates to other descriptors of this dissertation that characterize it as a cultural studies project. First, the following complex, core issue lies at the pith of this dissertation: power (as both an enabling and hindering force) is endemic of collaborative work and must therefore be understood in order to help generate new knowledge construction. Collaborative work inherently underscores the conceptualization of knowledge as fluid and contextually situated in that the benefit of working with others will help to expand contextually situated individual understandings (Anderson, 2013; Brooks, 2013). I further suggest that this is a sociopolitical project within an undergraduate educational context that purposefully intertwines critical social theory with an aim to improve pedagogical practices rooted in social constructivist spaces at the undergraduate level. As students enter into social interactions with pre-conceived notions regarding the validity of knowledge, facilitators of collaborative efforts must be cognizant of the social constructs that influence how students navigate new knowledge construction in collaborative spaces (Fredrickson et al., 2013; Narayan,

Rodriguez, Araujo, Shaqlaih, & Moss, 2013). By applying Gee's (2004) approach to *cda* on archival data which embodies student experiences working in collaborative groups, I hope to examine how power manifests in these interactions to help facilitators use theory to better their pedagogical practices in collaborative spaces.

To apply this directly to the CIDI course I posit the following. The purpose of the CIDI course that provides the undergraduate context for this dissertation is to pair nursing with chemical engineering students in order to foster interactions that build new knowledge to address a unique health care challenge (Sanders & Geist, 2016). Interdisciplinary student teams are required to construct new knowledge in the form of a prototype of innovative technology as described by social constructivist and constructionist assumptions of learning (Arce et al., 2015; Papert, 1980; Sanders & Geist, 2016). Being a relatively new course, however, it is yet to be understood how the students comprising these interdisciplinary teams negotiate power and piece together distinct, discursive constructions to contribute to knowledge construction (Sanders & Geist, 2016). Further, with regards to collaborative learning practices, better understanding how power influences knowledge construction in this setting has the potential to uncover what type of interactions are valued and integrated or marginalized and policed as part of these contributions (Hyttén, 1997). I therefore propose that this dissertation is a cultural studies project as it offers a space in which student-formed discourse can be critically analyzed to reveal underlying power dynamics – specifically between students representing the two disciplines within the groups (i.e., nursing and chemical engineering) - that manifest and may impact new knowledge creation within interdisciplinary interaction.

Significance & Broader Impacts

This dissertation is inspired by the potential offered by collaborative learning as empowering to both students and instructors working in postsecondary, interdisciplinary

interfaces. I thus submit that this dissertation will further the cultural studies scholarship on several levels. First, this dissertation will help undergraduate level educators better understand the underlying factors related to power, subjectivity, and discourse as they appear in the interaction of nursing and chemical engineering students enrolled in an undergraduate collaborative learning environment. The discursive nature of this study will therefore not only provide insight for educators to evaluate how to address communication issues and effectively strengthen the interactive exchanges of their students, it will also provide an avenue to advocate the use of critical pedagogy as a way to mediate asymmetrical issues within interdisciplinary learning practices (Brooks, 2013; hooks, 1993; Shapiro, 2013; Wolfe & Powell, 2009). Understanding how students interact within an interdisciplinary environment and the challenges they face with regards to communication, planning, and project execution will additionally help instructors employing group projects better design the formation of inclusive teams. These efforts will advance the ways instructors can empower students to engage in new knowledge construction.

The Conceptual Framework

In the following I will introduce the conceptual and analytical frameworks that comprise the foundation and drive the analysis for the work conducted in this dissertation. I present *critical discourse analysis* as the conceptual framework and Gee's (2004) approach to *cda* as the analytical framework for this dissertation. *Critical discourse analysis* as a framework is founded in a socio-cultural interpretation of language that helps to make the connection between discourse and the social realities that result from these interactions (Fairclough, 1992; Gee, 2004; Rogers, 2004). As the assumptions adopted by cultural studies scholars and critical social theories helped to advance *critical discourse analysis* as a legitimate approach to socio-cultural linguistic analysis, I integrate a discussion of these theories in order to introduce the theoretical

foundation in which *cda* is rooted. A description of *cda* commences this discussion, followed by a description of poststructuralism, anti-essentialism, and postmodernism, an introduction to the purpose of critical social theory, and the role of language when these assumptions are adopted. The analytical framework is then presented as a specific approach to *cda* which encompasses Gee's (2004, 2008) *Theory of Language* and the theoretical tools embraced by his approach to understanding the role discourse plays within the dynamics of power and social reality.

Critical discourse analysis

Critical discourse analysis comprises the conceptual framework for this dissertation as it is an interdisciplinary platform within which the influence of language, identity, and power in knowledge creation can be explored (Chouliaraki & Fairclough, 2010; Fairclough, 2005; Rogers, 2004).⁶ It is essentially a framework rooted in the postmodern and poststructuralist conceptualization of language that also combines the cultural studies and critical traditions noted above (Rogers, 2004). This framework is a product of the New Literacy Studies movement that garnered attention in the 1990s (Riessman, 2008; Rogers, 2004). The New Literacy Studies was a creative platform by which researchers could understand language within a more holistic socio-cultural theoretical framework: that is, not just as the spoken word, but as a product of specific social, cultural, historical processes (Gee, 2008). *Critical discourse analysis* scholars purposefully integrated aspects from various theoretical traditions to examine discursive

⁶As noted, in this dissertation I am utilizing Rogers' (2004) conceptualization of *cda* as a more holistic version of the field that encompasses a larger breadth of approaches to critical discourse research. I highlight this in an effort to address Gee's (2004) labeling contention that all linguistic analysis that utilizes a critical socio-cultural approach to language is inherently critical and therefore does not necessitate the distinction.

practices in an effort to underscore the ways in which such practices serve to instill social and political domination (Fairclough, 1992, 2005). As one of the founders of *cda* research, Fairclough (2013a) offers that *critical discourse analysis*, “brings the critical tradition in social analysis into language studies, and contributes to critical social analysis a particular focus on discourse, and on relations between discourse and other social elements (power, ideologies, institutions, social identities, etc.)” (p. 178). He furthers that *cda* is an inherently a multifaceted approach to linguistic and language studies that is anchored in the assumption that language and power are intimately linked (Fairclough, 1992, 2005). The purpose of *cda* work is therefore well-aligned with the notion of a cultural studies project as the aim is to examine underlying assumptions of knowledge via different socio-cultural linguistic lenses to uncover hidden power imbalances associated with identity and subjectivity politics (Barker, 2012; Rogers, 2004).

Language (as a socially constructed medium representative of these identity and subjectivity struggles) has become the tool by which *cda* scholars can investigate such dynamics in an effort to make an impactful change in the sociopolitical project in which their core issue is situated (Chouliaraki & Fairclough, 2010; Gee, 2004; Rogers, 2004). Unlike conventional conversation analysis that downplays the role of social structure in discourse, *cda* work necessitates the acknowledgement of the influence of social constructs (e.g., social class, power, identity, ideology) on discursive formations and practices (Brissett & Mitter, 2017; Fairclough, 2013a; Gee, 2004; Rogers, 2004). This conceptualization of language was heavily influenced by a Foucauldian interpretation of the role of discourse and power in knowledge construction (Fairclough, 2013a; Roger, 2004). *Critical discourse analysis* in this sense has been described as both a normative and explanatory form of critique. It is the former in that it goes beyond simply describing observed realities to purposefully evaluate such observations against dominant values,

practices, and ideologies (Fairclough, 2013b; Gee, 2004, 2008; Lim, 2014). It is the latter in that, once these realities are evaluated against these norms, such research attempts to explain them through the use of theories rooted in a critical traditions that analyze power, influence, and the social implications of the like (Chouliaraki & Fairclough, 2010; Fairclough, 2013b).

In order to unravel the power relations inherent in social narrative, critical discourse analysis requires that a socio-cognitive interface (i.e., explicit and differing perspectives) be present in the narrative (van Dijk, 1993). In addition, *critical discourse analysis* centers on addressing contextual asymmetries that become apparent in the discursive formations that are a product of social interactions (Fairclough, 2013a; van Dijk, 1993). Such research has had an influential impact on educational studies wherein learning is conceptualized as a type of social interaction in which knowledge is not held by one person, but constructed through language positioned at the intersection of various socio-cultural contextual markers (Gee, 2008, 2011; Rogers, 2004; Rogers, Malancharuvil-Berkes, Mosley, Hui, & O'Garro Joseph, 2005). Situated within this scholarly tradition, I contend that the CIDI course archival data provides such an interactive platform with which to conduct *cda* research. As a cultural studies project rooted in a *cda* conceptual framework, this dissertation focuses on student discourse to investigate how power - associated with the unique social identities of students enrolled in the CIDI course - interacts with the collaborative nature of knowledge construction as it pertains to collaborative learning. To better the theoretical foundations driving *cda* work, I now turn to the theories adopted by cultural studies scholars that describe the fluidity of language and identity formation within a socio-cultural context; here I introduce poststructuralism, anti-essentialism, and postmodernism. Then I turn to critical social theory to understand how the concept of power enters into this conceptualization. I end with a section describing the role of language as formed

from the traditions outlined by these theories as this provides a transition into the presentation of the analytical framework utilized for this dissertation.

The Post and Anti –isms

Although several intellectual theories are associated with cultural studies, three strands in particular help to establish the central assumptions associated with identity, discourse, power, and knowledge that are central to this dissertation (Barker, 2012; During, 1993). The first of these is poststructuralism which moves away from the strict interpretations of its predecessor (i.e., structuralism) and emphasizes that meaning is unstable (Barker, 2012). Structuralism is a theoretical framework that understands society as a system of relations that are products of stable structures (Barker, 2012). It is considered an anti-humanist conceptualization of society in which individual agency is not relevant as structural forces supersede individual acts (Barker, 2012). Structuralists argue that meaning within this conceptualization of society can therefore be found through the analysis of these relations which can be described as fixed, binary pairs (e.g., black and white, good and bad). Language, for example is a structural system that represents signs and meanings associated with such binary relationships (Barker, 2012). Post-structuralism is both a critique and re-adaptation of structuralism in that it purposefully re-centers human agency in the conceptualization of society but maintains that language is a medium by which such agency can be analyzed (Barker, 2012). For post-structuralists, meaning is inherently unstable, not fixed or binary – therefore, such linguistic analysis must be intertextual in that the meanings are products of a process rather than a determined relationship. However, post-structuralism remains an anti-humanist theory in that it emphasizes these processes instead of human agency in the production of stable meanings (Barker, 2012).

Anti-essentialism furthers the poststructuralist assumption that meaning is unstable and posits that truth and identity are productions of culture anchored to specific points in time and

contexts (Barker, 2012; During, 1993). To understand anti-essentialism we must, again, first begin with its predecessor essentialism. Essentialism is the belief that every individual has a true *essence* and our objective as individuals is to discover the meaning associated with this essence (Barker, 2012). The goal for essentialists is then to keep investigating until they have uncovered the essence of what comprises human identity. In contrast, anti-essentialists believe that there is no such thing as an essence – but rather identity is not a thing but a description encased in language. Anti-essentialism thus runs counter to essentialism and underscores that social categories are not underlying *truths* but rather discursive constructions (Barker, 2012). Giddens (1991) posits the following regarding this notion: “Identity is not a thing we have, nor an entity or a thing to which we can point. Rather, identity is a mode of thinking about ourselves” (as cited in Barker, 2012, p. 222). In turn, the goal of investigating truth and identity should not be to uncover human essence, but rather, to figure out which discursive practices create the differences within the social identities that we adopt and must navigate in the first place.

Postmodernism, in turn, adds to these theories in its characterization of *knowledge* as multifarious, fragmented, and linked to specific contexts and time (Barker, 2012; Lyotard, 1993). The postmodern view of multiple forms of knowledge highlights the significance of personal experiences in the formation of such knowledge – that is, new knowledge creation is intimately linked to experiences (Noddings, 1995; Thayer-Bacon, 2000). For postmodern theorists there exists no *one totalizing knowledge* that is capable of explaining and encompassing an objective conceptualization of the world as human existence is complex, heterogeneous, and thus necessitates multiple viewpoints by which to interpret knowledge (Barker, 2012, p. 21). Postmodernism highlights what Noddings (1995) characterizes as the *sociology of knowledge* - that knowledge is embedded within social contexts and these dynamics dictate the construction

of knowledge. In this regard, several sociological elements can be applied to the study of knowledge creation including: knowledge is connected to power, known expertise is ever-evolving, certain groups profit from or are hurt by different knowledge claims, and language develops, grows, and changes dependent on the practices of the community creating such knowledge (Noddings, 1995). The sociology of knowledge argument posits that knowledge creation can be characterized by two primary descriptors: it is specific to language and is therefore local, plural, and diverse (Barker, 2012).

These theories suggest that subjectivity is a product of discursive formation and identity, knowledge, and truth are subject to multiple positions (Barker, 2012). The *cda* approach used in this dissertation is inspired by these theories and anchored in the abovementioned cultural studies framework. These theoretical tools help delineate the social elements that facilitate or hinder new knowledge construction as well as demarcate the purpose and influence of discourse, identity, and communication with regard to such construction (Gee, 2004, 2008). Within this perspective social interaction and new knowledge construction are conceptualized as inherently heterogeneous, based on multiple experiences, and embedded in language. Understanding critical social theory and the role of language in *cda* will help to delineate the role of discourse in power dynamics.

Critical Social Theory and Power

Critical social theorists spearhead the examination of assumptions that reinforce the idea of universals and essences. In scrutinizing the idea of assumed universal understanding, critical social theorists aim to expose dominant assumptions that both control and contain what is valued as knowledge (Thayer-Bacon, 2000). Such examination is part of a purposeful objective that aims to empower individuals through theory to recapture their autonomy by resisting or

countering these underlying power dynamics (Barker, 2012; Noddings, 1995). In this regard, Noddings (1995) insists that critical theory is straightforwardly political in nature in that it purposefully engages in the social struggles and movements endemic of the time in which the critical scholars engaging with such movements observe. She contends that three such struggles that impact the field of education include sexism, racism, and classism (Noddings, 1995). Critical social theory scholarship provides an avenue for understanding and advancing the counter-positions in these movements and includes the scholarship highlighted in chapter two of this dissertation and more generally the following fields: feminist scholarship which analyzes the ways in which women have been traditionally denied power by men to partake in the process of creating knowledge; Marxists and neo-Marxist scholarship that underscored the value of knowledge as dominated by specific economic and social class values which legitimizes one form of knowledge over another; and third world scholarship which points attention to the differences of race, ethnicity, and social class as it manifests in the domination of Euro-western values over non-Euro-western values in both contexts (Barker, 2012; Noddings, 1995; Thayer-Bacon, 2000).

In order to examine dominant assumptions linked to supposed universal knowledge, critical social theory attempts to explore knowledge creation through the lens of various experiences in order to expose issues of dominance, power, and subjectivity within situated social and historical contexts (Barker, 2012). This central purpose of critical social theorists to expose these imbalances runs parallel to another purpose: pushing the context in question to improve through *praxis* or the intertwining of theory with action (Thayer-Bacon, 2000). Thus, most critical social theory research aligns with the abovementioned descriptors of cultural studies work in that theory iteratively informs research that combines with an aim to then improve the

practices of such research and the context in which these practices are implemented (Wright, 1996). As a cultural studies project in education, for example, critical social theory would encourage teachers to not only utilize critical research as a guide to better understand the effects of their teaching practice on students, but also to inform them how such practices can be improved to empower their students to create their own knowledge within their own situated, social context (hooks, 1993; Noddings, 1995; Thayer-Bacon, 1998).

The Role of Language

Language has also been highlighted as part of the constitution of the persons creating knowledge and, more importantly, a central element for understanding the contextual and socio-cultural circumstances in which knowledge is created (Gee, 1999, 2008; Weedon, 1997).

Language – understood as discourse and narratives generated in the aural, visual, and printed materials that convey human communication – influences cultural and social norms which in turn impact the formation of social identity and subjectivity (Barker, 2012; Hytten, 1997).

Identity is regulated by our way of speaking and is thus not a fixed, eternal construction (Barker 2012; Hall 1996). As Weedon (1997) explains, language is the tool by which individual negotiate, interpret, and internalize meaning providing indication into what is socially accepted or rejected within a specific context. In turn, individuals can become subject to specific meanings and through particular exchanges that can be contested, adapted, or affirmed (Weedon, 1997). This is because subjectivity is a discursive production: individuals do not come into being without some form of communication or language that is consequently formed within a determined social, historical, and political context (Barker 2012; Foucault, 1980, 1993; Thayer-Bacon, 2000).

An example of how language is intertwined in identity and social construction can be found in the work of Jacques Derrida. Derrida's (1976, 1993) work in *Of Grammatology* and

Structure, Sign, and Play in the Discourse of Human Sciences expands on the notion of communication as a linguistic system of socially derived symbols. Derrida (1976) posits that all which is considered knowledge and truth is unstable as they are formations of signs that are not fixed. With his concept of *différance*, Derrida (1976) argues that the production of meaning is in actuality deferred and supplemented within the processes of communication. Concerning knowledge construction, Derrida (1993) suggests that language and the symbols attached to discourse limit the possibility of original construct. In accordance, power (via signs) confirms privilege through the logos of discourse, which only allows certain signs to permeate (via linguistic structure, syntax and lexicon) inhibiting the formation of a “total engineer” of knowledge (Derrida, 1993, p. 6). Derrida (1993) offers deconstruction as a way to expose these unacknowledged asymmetries between what discourse is intended to mean and how it is in reality interpreted as a form of resisting the dominance of unchallenged signs. However, the Foucauldian interpretation of the influence of language aggregates a more comprehensive conceptualization to this notion of power as intertwined in discourse.

For several scholars, Foucault’s contributions provide a fluid account of the influence of power within discursive practices and social interaction (Barker; 2012; Mills, 1997; Munns & Rajan, 1995; Sawicki, 1991). Barker (2012) expands on this point suggesting that Foucault’s main argument stems from his description of power as a form of exchange between individuals that is unstable and continuously negotiated. Illustrative of this notion, in *The Archaeology of Knowledge and the Discourse on Language* Foucault (1972) offers a historically based analysis of the archeology of discursive structures, in which he uncovers the mechanisms that help statements make sense within a specific, socially constructed context. Language is therefore not a mere set of organized ideas, but rather contextually significant relations that are given force

within a specific place and time; such force undergirds knowledge construction by regulating and converting cultural norms into discursive practice (Foucault, 1972; Munns & Rajan, 1995). Power, then, is not necessarily a fixed force, but rather an action or relation that implicates growth (Foucault, 1972, 1980, 1981). It is productive and based on institutional and cultural practices that regulate social negotiations (Foucault, 1978, 1982; Munns & Rajan, 1995; Sawicki, 1991).⁷

In the world of critical theory, the issue of identity and language is thus complicated. The abovementioned anti-essentialist notions would posit that we are social creatures that constantly change and define our identity based on where we are, who we associate with, and how we internalize the messages we get from the contexts in which we find ourselves. Postmodernists and poststructuralists alike would argue two notions associated with this conceptualization of language as embedded with identity: that subjectivity is an effect of discourse and that subjects are therefore fractured in that different discourses offer us multiple, subjective, positions by which to create and interpret meaning (Barker, 2012). To further this point, Barker (2012) contends that, “Poststructuralism and postmodernism are anti-essentialist approaches that stress the constitutive role of an unstable language in the formation of cultural meaning” (p. 22). With regards to new knowledge construction, language thus plays an important role as it is the conduit of individual thought formed by a unique combination and understanding of these social identities, meanings, and values (Barker, 2012; Hall, 1993). Effectively, critical social theorists

⁷ Foucault’s interpretation of the dynamics inherent between discursive formations, power, subjectivity, and knowledge will be further explored in chapter two as part of the literature review for this dissertation.

utilize language and discourse as a representative medium in which the power, subjectivity, and identity struggles inherent in social contexts can be examined (Noddings, 1995; Thayer-Bacon, 2000). As noted, the influence of these theories and the prevalence of this scholarship helped to inspire a new interpretation of language that, in turn, motivated the reconceptualization of linguistic and language studies in the formation of the New Literacy Studies movement (Rogers, 2004).

The Analytical Framework

There is purposefully no formal approach outlined by scholars to engage in *critical discourse analysis* research (Gee, 2004; Rogers, 2004). This reasoning stems from the acknowledgements that each research project is unique and dependent on the contextual complexity inherent in the discursive practices being analyzed (Rogers, 2004). However some scholars contend that due to its disciplinary influences, *cda* research must combine some form of grammatical or textual analysis with sociopolitical and critical theories of society (Brissett & Mitter, 2017; Gee, 2004, 2001; Lim, 2014). For this purpose, the analytical framework I will use to conduct this analysis is a specific approach to *cda* that has been developed by James Gee. Gee's (2004, 2008) Theory of Language offers an approach to *cda* that incorporates two complementary forms of text-based analysis that center on his Seven Building Tasks and Theoretical Tools of Inquiry (i.e., Discourses, social languages, situated meanings, and figured worlds/cultural models). Both will be developed in the following.

Gee's (2004, 2008) Theory of Language

James Gee is an American theoretical linguist and educational researcher whose work is heavily influenced by Chomskian linguistics, neo-Marxist theories, and socio-cultural approaches to language and literacy (Rogers, 2004). His work on psycholinguistics,

sociolinguistics, and discourse analysis is described as a synthesis of formal and functional linguistic and structural methods, cognitive sciences, postmodern literacy theory, and critical social theories that emphasize the historical and social contextual factors and their influence on literacy and language (Riessman, 2008; Rogers, 2004). Gee's work in advancing these fields and his educational research focus established him as part of the founding of the New Literacy Studies in the 1990s (Riessman, 2008; Rogers, 2004). According to Gee (2008), the New Literacy Studies was a creative framework by which researchers could comprehend literacy and language through a variety of perspectives, including: cognitive, social, interactional, cultural, political, institutional, economic, moral, and historical contexts (p. 2). This new wave of discourse and linguistic analysis emphasized a Foucauldian conceptualization of language as a social rather than a linguistic category (Gee, 2008; Rogers, 2004).

Within the New Literacy Studies framework, language is represented in a more multi-faceted form that also encompasses the socio-cultural factors that elevate its significance as a system of symbols for meaning making (Gee, 2004, 2008). Situated within this framework, Gee's (2004, 2008) Theory of Language emphasizes that its purpose is inherently linked to the symbols and meaning we associate within the context and actions entwined with discursive exchanges. More importantly, Rogers (2004) indicates that such exchanges motivate the actions we take in order to build or destroy the social constructs established within our own social realities. For example, the social construct of marriage is not an isolated action; rather it is based on a sequence of connected actions (e.g., plans, goals, promises) discursively exchanged within a specific context over a period of time (Rogers, 2004).

Gee (2008) elaborates on this through his description of his theoretical Seven Building Tasks that comprise the ways in which discourse becomes *languages-in-use-in-society* (i.e., tools

for building social constructs into reality). Through his Theory of Language, Gee (2004, 2011) establishes the power of discursive exchanges as a tool for building or destroying socially constructed realities as languages-in-use-in-society. According to Gee (2004, 2008), whenever a discursive exchange is made in a specific social context, one of seven areas of social reality is impacted: significance, activity, identities, relationships, politics, connections, and sign system and knowledge. Gee (2004, 2008) describes these realities as follows: through language, humans are able to place a level of importance or triviality on things, which inherently determines its socially constructed *significance*; language is also utilized to carry out a socially recognized and intuitionally or culturally supported endeavor (*activities*) that implicates subsequent actions (e.g., making promises); language also helps humans to establish or be recognized for a certain identity or role within a specific context (*identities*); the formality and informality of languages also influences how humans build and sustain *relationships* (e.g., using an individual's professional title establishes a formal and deferential relationship versus using a nickname which indicates a level of intimacy); regarding *politics*, language also builds and destroys social goods within a specific context (e.g., treating people with respect versus not treating them with respect); language can also establish *connections* by how we place significance via strategic lingual associations (e.g., healthcare is a form of socialism); finally, language is used to privilege or place prestige on certain *sign systems* and *form of knowledge* effectively building or destroying varying way of knowing the world (e.g., elevating academic writing as forms of reason over poetry as forms of emotional expression) (pp. 30-33).

Utilizing these Seven Building Tasks, Gee's (2004, 2008) analytical lens turns to a specific perspective on literacy and languages that is centered on uncovering the theoretical underpinnings of his understanding of Discourse. Gee (2004) distinguishes Discourse with a

capital “D” from discourse with a lower case “d” through the following: wherein Discourse constitutes a form of communication that holds significance among one another and thus surpasses both time and history, discourse simply represents stretches of oral or written language (i.e., texts) (p. 23). This theory of language therefore focuses on understanding the over-arching socio-cultural elements associated with Discourses over the linguistic and grammatical structural elements inherent in the study of discourse (Rogers, 2004). Gee (2004) argues that the point of such analysis is to advance from an understanding of specific uses of language within specific contexts (situated meanings) to a more complex investigation that incorporates the identities and institutions with which such exchanges are associated (Discourses), the different language systems being used (social languages), and the underlying theoretical models that govern the social world in which these exchanges are made (figured worlds/cultural models) (Rogers, 2004, p. 12). Effectively, Gee’s (2004, 2008) Theory of Language shifts from a cognitive or psychological understanding of language to a more sociocultural approach to language that emphasizes the social and cultural elements impacting languages-in-use-in-society (p. 2).

Gee (2004, 2011) distinguishes his form of *cda* by suggesting that his approach not only underlies the importance of understanding the correlations formed by language exchanges and their associated meanings within a particular context, but also how such exchanges are associated with social practices. For Gee (2004), critical approaches to discourse analysis must:

go further and treat social practices, not just in terms of social relationships, but also in terms of their implications for things like status, solidarity, the distribution of social goods, and power (e.g., how language in a job interview functions as a gate-keeping device, allowing some sorts of people access and denying it to others). In fact, critical

discourse analysis argues that language-in-use is always part and parcel of, and partially constitutive of, specific social practices, and that social practices always have implications for inherently political things like status, solidarity, the distribution of social goods, and power. (p. 28)

Gee's approach to critically analyzing the discursive exchanges that constitute languages-in-use-in-society is therefore representative of a particular lens of research which is inspired by three traditions - American anthropological linguistics and narrative, social discourse theories, and cognitive psychology (Rogers, 2004, p. 11). Rogers (2004) also emphasizes that Gee's theoretical tools are grounded in narrative analysis, social linguistics, and social and cultural cognition. This unique lens has implications for educational research. Gee argues that through such a framework, learning cannot be reduced to only a cognitive or psychological dynamic; rather, instead, it needs to be viewed as a type of social interaction in which knowledge is dispersed across people and various contexts, linked in both mind and body, and expressed through a variety of tools, technologies, and meaning (Rogers, 2004). Only when viewed in this regard can *cda* work investigate learning through the combination of situated cognition theories, sociocultural approaches to language and literacy, and assumptions rooted in critical social theory (Rogers, 2004). To help with such analysis, Gee (2004, 2008) establishes his Theoretical Tools of Inquiry that will also be used for this dissertation analysis.

Theoretical Tools of Inquiry

The Seven Building Tasks described above are meant to be practices designed for research analysts to investigate how language impacts socially constructed realities (Gee, 2004, 2011). These theoretical Building Tasks are intended to help uncover themes present within

discursive formations. Gee's (2004, 2008) Theoretical Tools of Inquiry (i.e., Discourses, social languages, situated meaning, and figured worlds/cultural models), in turn, are complementary to these tasks and are meant as theoretical devices that express his Theory of Language within *critical discourse analysis*. These tools are centered in theories from distinct academic disciplines that illuminate how language connects to socially constructed realities (Gee, 2004, 2008). The pith of these tools rests in a model of discursive interactions which posits that these seven, abovementioned realities are transformed within a three-way simultaneous interaction comprised of social or cultural group memberships, a mix of various social languages, and a particular context set within a certain historical and temporal space (Gee, 2004, p. 93). Effectively, language is a set of consumptive, productive, distributive, and reproductive processes that affect real change in the social world in which is utilized (Gee, 2004). However, as language is both the object of critical discourse analysis and a theoretical device used for meaning making, these tools are meant to help establish theoretical demarcations to indicate how language is affecting change within these dynamics (Gee, 2008, p. 6). The use of these tools as an approach to *cda* therefore allows for understanding how language correlates to social practices in ways that shape the nature of such practices; because such practices involve issues of status, identity, and power, they flow "bottom-up" in *cda* work and are considered empirical claims (Rogers, 2004, p. xiii).⁸ Although briefly introduced in the previous section, in the following I will describe these tools in depth.

⁸ The purpose of critical discourse analysis is to understand the power dynamics present in language that influences social reality. Within this context, Rogers (2004) utilizes the word *empirical* to mean as taken from experience or observation. This, however, does not imply that

Discourses

The way that individuals talk and act is not an individual endeavor (Gee, 2004, 2008). Rather it is as part of a collective - something larger than the individual, in which they represent a social or cultural membership that permits them a sort of recognition among the people with which they wish to interact (Gee, 2004, 2008). These social groups or memberships influence the construction of a distinctive way with words that allows for an associated identity or activity to form when and if communicated properly (Gee, 2004). Such memberships permit meaning making to go above and beyond mere words, to incorporate objects, tools, technologies, and networks of people who validate and substantiate the associated identity (Gee, 2004, 2008). These groups may include, for example, cultures, ethnicities, professions, academic disciplines, interest-driven groups, organizations, *inter alia* (Gee, 2004, p. 36).

For Gee (2004), these memberships or groups provide the basis for what he describes as *Discourses*. He posits:

Discourses are ways of behaving, interacting, valuing, thinking, believing, speaking, and often reading and writing, that are accepted as instantiations of particular identities (or “types of people”) by specific groups, whether families of a certain sort, lawyers of a certain sort, bikers of a certain sort, business people of a certain sort, church members of a certain sort, African-Americans of a certain sort, women or men of a certain sort, and so

cda work is meant to be causal or experimental; rather it is meant to explore and describe social phenomena through a theoretical analysis of the language that helps construct such a reality (Rogers, 2004).

on and so forth through a very long list. Discourses are ways of being “people like us.” They are “ways of being in the world”; they are “forms of life”; they are socially situated identities. They are, thus, always and everywhere social and products of social histories. (Gee, 2008, p. 3).

Discourses are much more than just language: they are social practices that are associated with a social theory and given relevance within a socially constructed world (Gee, 2008). Language, therefore, holds no meaning outside of such Discourses (Gee, 2004). Moreover, he acknowledges the hybridization of Discourses as it relates to the multifarious nature of socially constructed identities. That is, humans can identify with a variety of Discourses by adopting a primary Discourse (which provides an initial understanding of self and belonging) and combining such with various secondary Discourses that allow them recognition within a multitude of contexts (Gee, 2004, 2008). As meanings change and contexts shift, the Discourses that individuals associate with might also change and sometimes cease to exist within their socially constructed reality (Gee, 2004).

To help us understand the nature of Discourses, Gee (2008) provides five descriptive points. First, Discourses are inherently ideological. They consist of a set of values and viewpoints which often dictates the distribution of social goods, effectively categorizing who is considered an insider, who is not considered an insider, who is normal, and who is not normal within the defined group membership (Gee, 2008). Second, Discourses define what counts as acceptable criticism; therefore, they are resistant to scrutiny as those that might criticize from within will be subject to exclusion from the membership (Gee, 2008). Third, Discourses are also defined by its relations to other Discourses; that is, a Discourse’s position might be re-defined if

its opposing Discourse dissolves (Gee, 2008). Fourth, Discourses marginalize other Discourses as it places significance on certain values, perspectives, and objects over others (Gee, 2008). Finally, Discourses can empower individuals as they are, as indicated by descriptor one, ideological and therefore situated within a sociological hierarchical structure connected to the distribution of social goods (Gee, 2008).

Social Languages

Intimately related to the concept of Discourses is the conceptualization of *social languages*. The tool of social languages draws from sociolinguist theories and refers to language as a social practice: specifically, how people design the grammatical structures and functionality of language to convey certain, socially situated identities and relationships (Gee, 2004, 2008; Rogers, 2004). Wherein Discourse is the more macro-level set of values and characteristics that determine social memberships, social languages are the more micro-level utterances that people utilize to convey association with specific memberships (Gee, 2004, 2008). Social languages stem from the reality that when humans speak, they must make clear who they are in relation to whom they are addressing, as well as what they are doing in the larger context (Gee, 2008). Discourses can be composed of various social languages (Gee, 2008).

As an example, Gee (2008) illustrates how a former student communicated her reactions of a narrative of betrayal to her parents versus to her boyfriend. To her parents, she expressed disdain and discomfort in a restrained, yet sophisticated language distancing her social and emotional reaction to the story, favoring instead her cognitive involvement (Gee, 2004). With her boyfriend, however, her language stressed emotional, social, and affective involvement, and was representative of a more vernacular language structure (Gee, 2004). The more formal language utilized with her parents sets a particular identity (“school talk”) within a specific

relationship (daughter-parents), wherein the language with her boyfriend represents a different identity (partner) within a different relationship (girlfriend-boyfriend) (Gee, 2008, p. 92). In using this example, Gee (2008) argues that despite both reactions being in English, the language itself is not monolithic but rather malleable to represent “multiple *whos*” and socially constructed “*whats*” (Gee, 2008, p. 93).

This complicated dynamic rests in the realization that an individual can represent a multitude of identities in different contexts and that language can express different things within these contexts (Gee, 2004, 2008). For Gee (2008) this description of *social languages* is associated with the concept of *heteroglossia* from the Russian literacy theorist Mikhail Bakhtin (1981, 1986) who suggested that individuals often have multiple voices (i.e., heteroglossia). *Social languages* are representative of *heteroglossia* as they are often impure hybridizations of various other, different *social languages* that are representative of most individuals’ multiple voices (or to relate back to *Discourse*, multiple social membership groups) (Gee, 2008). Therefore, no one speaks a single, uniform language as no one is representative of a single, uniform socially constructed identity (Gee, 2004, 2011).

Situated Meanings

The concept of *situated meanings* is a theoretical tool that draws from cognitive psychology to speculate how humans make meaning from language (Gee, 2004). This concept posits that humans actively build meaning when language is utilized in specific (social, historical, and temporal) contexts (Rogers, 2004; Gee, 2004). In actual situations of use, words and language structures exhibit specific meanings based on the contextual markers (Gee, 2004). This also implies that speakers assume their listeners share enough knowledge about the beliefs, values, and experiences of the context to be able to actively situate or derive such meaning (Gee,

2004, 2008). Gee (2004) provides the following example: the word ‘cat’ implies different meanings when situated in different contexts (e.g., Big cats are endangered versus Egyptian cats were sacred symbols) (p. 23). Within the framework of the Seven Building Tasks, situated meanings often involve a level of manipulating sign systems and forms of knowledge within a specific historical, intertextual, and social frame (Rogers, 2004).

According to Gee (2008), situated meanings are always (in part) associated with intended exclusions and inclusions within an assumed sematic field. These exclusions and inclusions are driven by three principles: the exclusion principle, the guessing principle, and the context principle. The exclusion principle posits that because people differ significantly in the sets of words available to them, the meanings we derive from exchanged words are partially dependent on a matter of what other words are familiar (Gee, 2008). The set of words available to different people makes different social languages – however, these differences are not rigid but porous, making the jump from one social language to another a matter of degree (Gee, 2008). The guessing principle suggests that we make judgments about what others mean by guessing what other words that specific word in use is meant to exclude or not exclude (Gee, 2008). People utilizing the same social language within the same larger Discourse often make better “guesses” about the situated meaning of an exchange (Gee, 2008, p. 100). However, if we do not share the same social language or social membership, we can make better guesses of the situated meaning of a word through consideration of the context of the exchange (Gee, 2008). This is deemed the context principle wherein the meaning of words (i.e., the exclusion or non-exclusion of other words) is relative to the assumptions about what the relevant context is and can therefore change with contextual markers (Gee, 2008). These three principles, in turn, lay out the following assumptions about words and meaning: words have no meaning by themselves or in and of

themselves, their meanings only manifest relative to choices and guesses about other words, and these are relative to the contextual assumptions in which they are exchanged (Gee, 2008).

Figured Worlds or Cultural Models

For his fourth tool of inquiry – *figured worlds* or *cultural models* - Gee (2004) draws on psychological anthropology theories which delineate that humans form and use theoretical frameworks to give language meaning and make sense of the world.⁹ These frameworks become simplified templates (go-to guides) that consist of narratives, folk theories, schemes, frames, and images to assist humans in understanding how things work and what is deemed “normal” within a specific socio-cultural perspective (Gee, 2004, p. 36). What counts as a typical template for people differs by their socio-cultural affiliations that are, in turn, influenced by specific values, beliefs, and knowledge (Gee, 2004). These templates are situated within people’s mindsets, their traditions, texts, canons, rituals, and *Discourses* – these are what Gee (2004) refers to as figured worlds or cultural models.

When people work from a particular figured world or cultural model, they are imagining what the world looks like from a certain “normalized” or “typical” perspective that is situated within a specific set of values and beliefs (Gee, 2004, p. 43). Such figured worlds or cultural models are images or aspects of *Discourses* at work within a specific, socially constructed reality

⁹ Figured worlds and cultural models are often combined in Gee’s (2004, 2008) work as they are related concepts, with the latter often embodying a more comprehensive form which includes the former. However, for the purpose of delineating the significance of both concepts as part of Gee’s (2004, 2008) Theoretical Tools of Inquiry, I incorporate both terms in this description of the analytical framework.

(Gee, 2004, 2008). Figured worlds – narratives, images, oral traditions – and cultural models – frozen theories, generalizations – are for Gee (2008) akin to “movies” in the mind; simplified simulations that depict a prototypical model by which to compare and understand the real world (p. 104). They are based on social theories that help us form distinctions and meanings through established values and belief systems (Gee, 2004). Gee (2008) provides the following example: in our Euro-western cultural model, the word ‘teaching’ is closely related to our notion of a classroom space, with one teacher, idle students, and a lecture-based lesson plan. This cultural model makes it easy for us to more readily associate teaching French with teaching history, wherein it also distinguished that what coaches do on a football field is not necessarily teaching as it does not fit our figured world of teaching within a classroom space (Gee, 2008).

In this description, Gee (2008) also problematizes figured worlds and cultural models. For him, in utilizing such frameworks, we are allowing social institutions (i.e., languages) to perform much of the thinking aspects of communicative exchanges for us (Gee, 2008). That is, if we use figured worlds or cultural models to make meanings or understand reality, we are not engaging in reflexive activity in so much as we are simply following routines established by conventional habits we learned through a socialization process (Gee, 2008). Figured worlds and cultural models are learned by being acculturated, having experiences within a cultural or social group, by practicing language and interaction in meaningful contexts (Gee, 2008). In such settings, one is also learning the values and belief systems associated with these worlds and models, something that Gee (2008) labels a *master myth* or certain characteristics and values that a group embraces as favored wisdom. Master myths may conflict with a changing social reality as the values inherent within one of the multiple Discourses embraced by humans may actively oppress other figured worlds and cultural models (Gee, 2008). Gee (2008) emphasizes that

figured worlds and cultural models may allow humans to function and communicate in their social worlds with ease, but at the price of routinized thought, stereotyping, and normalized perceptions (p. 114). He also counters this by pointing to the reality that the type of reflective thinking needed to decode social languages and situated meanings might slow communication down to a point where effective exchanges will become too difficult to make, therein marking the value of figure worlds and cultural models (Gee, 2008).

How this Analytical Framework will be Utilized

Although there exist several approaches to *cda*, I believe Gee's (2004) Theory of Language and his subsequent theoretical tools encompassed by this theory provide a beneficial and robust analytical framework by which to analyze the themes taken from the archival data collected from the CIDI course. As the students enrolled in this course were attempting to create new knowledge through their interactions, their reactions, reflections, and thoughts regarding this knowledge making process might reveal the Discourses, social languages, situated meanings, and figured worlds or cultural models that they were utilizing within these exchanges. In turn, since the purpose of *cda* is to uncover and describe power dynamics as they relate to socially constructed realities, I find that Gee's (2004) emphasis on the socio-cultural aspect of *cda* are more aligned with the purpose of this dissertation. Gee's (2004) approach to *critical discourse analysis* recognizes how discourse functions and can transform society. This is pivotal to the CIDI course analysis as I am trying to understand how student discourse is affecting change in new knowledge construction within the contextual framework of this course. Understanding this could then provide important pedagogical implications for helping students create a more dynamic, engaging, and creative collaborative learning space.

The Roadmap

I submit that this was a purposeful chapter of introductions. My intention was to introduce the issues that I propose to investigate in this dissertation, my motivation for such an investigation, and the relevant contextual markers that would deem the CIDI course a familiar context as we move forward. I also presented the overall research design, research questions, and the how and why for which I am conceptualizing this as a cultural studies project. From this, the conceptual and analytical frameworks for this dissertation were also introduced as a means to situate not only the theories I will be using as tools for this analysis, but also the methods.

Here, in an effort to guide readers through the structure of this dissertation, I provide a brief roadmap of what can be expected in the remaining chapters. Chapter two details a purposeful selection of existing research that looks at collaborative learning environments from different angles, including: group dynamics models, communication studies research, and postmodern scholars' takes on the convergence of identity, social reality, and knowledge construction. The purpose for including such an eclectic collection of literature is to emphasize that collaborative learning is a complex topic that can be investigated in a myriad of ways. The rationale for including these specific branches of scholarship is developed in chapter two. Chapter three builds on the analytical framework presented here and accomplishes two tasks: presents the archival data associated with this dissertation and delineates the specifics associated with the data analysis for this dissertation. In chapter three I also include background information pertaining to the description of the data, the data collection process, the Institutional Review Board (IRB) approvals for this work, my positionality regarding this type of research, and an overview of the issues and limitations of trustworthiness associated with *cda* work. I also detail

the specifics of the data analysis methods which provide the foundation for presenting the findings in chapter five.

Prior to presenting the findings from this analysis, I present the CIDI course in its entirety as a contextual framework for this project in chapter four. Chapter four builds on chapter three and provides the contextual background needed to understand the purpose, pedagogical framework, logistics, and activities that situate the CIDI course as a unique case study for this dissertation. The purpose of chapter four is to provide a thick description of the context in order to situate the analysis in a delineated and bounded contextual framework. Chapter five is devoted exclusively to the presentation of the findings from the two-stage critical discourse analysis conducted for this dissertation, connecting the thematic analysis to Gee's (2004, 2008) Seven Building Tasks and Theoretical Tools of Inquiry. Here, I not only expand on the initial themes that were found in the analysis of the archival data, but also analyze how these themes are situated within Gee's (2004, 2008) Theory of Language outlined above. Chapter six provides a complete discussion of the main takeaways from the findings of the critical discourse analysis, the pedagogical implications taken from this analysis, and future research endeavors.

CHAPTER 2
REVIEWING THE LITERATURE:
UNDERSTANDING GROUP DYNAMIC MODELS, COMMUNICATION STUDIES
RESEARCH, AND CRITICAL SOCIAL THEORY SCHOLARSHIP

Introduction

Chapter one was meant to be a chapter of introductions. Its main purpose was to set the stage for this dissertation by providing all of the relevant information needed to understand the central research problem, the motivation, the contextual framework, the research design and the conceptual and analytical frameworks within which this dissertation is situated. I centered the conversation on collaborative learning environments and motivated this work via my own interest in appreciating diversity and student voice. I label this a cultural studies project as it is centered on praxis in that this research will affect positive change in the way collaborative learning environments are implemented within undergraduate curricula. The theoretical foundation for this work is anchored in a *critical discourse analysis (cda)* conceptual framework and an analytical framework that centers on Gee's (2004) approach to *cda*.

I presented the CIDI course as a paradigmatic contextual framework within which to analyze this type of student interaction as this course is representative of an interdisciplinary, undergraduate collaborative learning course. The research design proposed the use of Gee's (2004, 2008) approach to *cda* as a way to explore archival data collected from this course in the form of focus group transcripts and debriefing notes. This analysis would address two research questions focused on exploring how power is constructed within undergraduate student exchanges and how it influences students' ability to work together to form new knowledge constructions. It is my aim that understanding these dynamics could improve student learning

within a collaborative context and further the implications to teaching that could help advance interdisciplinary communication, and thus, new knowledge construction within these interactive environments.

Purpose and Organization

The purpose of this chapter is to present existing scholarship which adds breadth and depth to the implications derived from this dissertation. Acknowledging that collaboration has been a topic of interest for several scholars representing a myriad of fields, a plethora of scholarship to better understand this type of interaction exists. However, as it is my task to situate this dissertation within the appropriate extant literature, I have chosen to look at three distinct fields of scholarship relating specifically to the elements that I am interested in investigating in this dissertation. These encompass group dynamic models, communication studies, and critical social theories regarding knowledge construction.

The first of these fields - group dynamic models - highlights seminal organizational models that have influenced the way collaboration has been understood at a systems level. These models provide a framework within which to understand social interactions in a group setting by use of organizational, behavioral, motivation, learning, and organizational creativity theories. For this dissertation, it is important to understand these different models as they provide a more global lens by which to analyze student interaction. Looking at these models could also help anchor the critical discourse analysis from this dissertation within an interactive framework in future work that could help improve pedagogical techniques utilized in undergraduate, collaborative learning environments. The second field – communication studies literature – represents a sample of empirical work that has investigated the communicative patterns that manifest within group settings. The studies I have selected for this section incorporate various

techniques including qualitative research, conversation analysis, and organizational behavioral models to better understand how communication influence group processes. As this dissertation is utilizing student discourse to understand how power manifests in student exchanges, these examples provide a complementary frame within which to situate the research derived from this course. As with the previous section, this field presents an area of study that could influence future directions regarding collaborative learning research.

Finally, the third field integrated into this chapter consists of three distinct sections representative of critical social theory work. The first section is entitled *Knowledge Construction and Discourse* and highlights work that utilizes critical social theories to understand how power influences discourse to form identity, subjectivity, and knowledge. For this dissertation, this scholarship provides insight into the work that influenced the New Literary Studies movement from which *critical discourse analysis* was born. The second section, *Knowledge Construction and Learning*, provides an overview of scholarly work that incorporates critical social theory to understand how schools as socially constructed spheres have influenced what type of knowledge is favored as legitimate in specific contexts. As I am investigating a learning environment and my focus is on student interaction, this scholarship provides backdrop to the theories that inform *cda* as an approach by which to understand what type of power dynamics might influence what knowledge is worth integrating in exchanges of knowledge construction. The third section, *Feminist and Gender Theory*, provides an overview of critical social theory work from the perspective of gendered social constructions. This work is significant to this dissertation as the two disciplines enrolled in the CIDI course are representative of traditional, social gender roles that, in turn, could influence what is considered knowledge within their respective academic mental models.

The remainder of this chapter follows the aforementioned structure. The first part of this literature review will focus on the group dynamic models that are relevant to understanding collaborative learning from an organizational lens. Communicative studies literature is represented in the second section of this literature review, wherein several examples of how communication has been studied within a group setting are presented. The following section presents the three sections comprising the literature representing differing aspects of critical social theory scholarship. The connection between these fields of literature to this dissertation and the pedagogical implications that will be taken from the *cda* conducted on the CIDI course archival data is then established. I conclude this chapter by presenting a roadmap for the next steps of this dissertation, including a brief description of the next chapter.

Studies of Collaboration through Group Dynamics (Part 1)

The literature on group dynamics and collaboration is expansive and has been the subject of interest for scholars representing several disciplines including sociology, organizational behavior, business, design, and social psychology. This literature views collaboration as a form of social interaction established within a particular, organized system. Prior to delving into the seminal works that represent this scholarship, a few constructs merit defining. First, a group within the proposed setting is defined as a system of three to four, interdependent individuals that are organized under a common objective who must interact with one another through various forms of communication to complete the objective (Forthy, 2006). Groups are considered collaborative in that the individuals must work with one another to expand their own knowledge base, generate new knowledge, and create a finalized product that is a reflection of their cumulative interaction (Bruffee, 1993, 1995; Papert & Harel, 1991; Zander, 1974). Collaboration in this context is hence conceptualized as a distinct form of group dynamics in which dissent and the negotiation of ideas is actively encouraged through communicative

mechanisms to allow a deeper understanding of diverse perspectives within the group (Bruffee, 1993, 1995; O'Donnell & Derry, 2005; Thompson Klein, 2005). Albeit the following is not a comprehensive list of the seminal texts that have furthered the scholarship on these topics, these works were selected for their role in providing a foundation with respect to the constructs of interest for this dissertation.

The first of these contributions is Tuckman and Jensen's (1977) revised five-stage group-development model. In analyzing fifty case studies of varying groups (e.g., therapy-groups, T-groups, natural groups, and laboratory groups), Tuckman (1965) proposed that groups working towards a specific objective or common goal proceeded through four distinct stages: forming, storming, norming, and performing. The forming stage is characterized by uncertainty and dependence on outside norms to understand a goal, create a purpose, and structure leadership whereas the storming stage contains intragroup conflict as members struggle with understanding one another and negotiating shared group norms (Tuckman, 1965). In the norming stage relationships are built and group members begin to assimilate into a common set of norms. The performing stage reflects a fully-functional, cohesive team that works collaboratively towards completing the assigned task. After reviewing twenty-two more case studies on small groups, Tuckman and Jensen (1977) revised this initial model and added a fifth stage, adjourning, as part of the exit activities that group members participate in once their objective is complete. A recent longitudinal study concerning a postsecondary course centered on innovative thinking via a group, computer-science capstone project found evidence to support Tuckman and Jensen's (1977) revised group developmental stages model (Largent, 2016). However, despite its validation as a theory for group development, this model does not explore the relationship

between group processes and outcomes therefore limiting the pedagogical applicability of the model to improve group effectiveness (Largent, 2016; Robbins & Judge, 2015).

A group dynamic model established within the field of education is Johnson & Johnson's (1989) Cooperative Learning Model (CLM). This model outlines five necessary conditions for effective student interaction: positive interdependence, individual accountability, promotive interaction, the development of appropriate social skills, and group processing (Felder & Brent, 2015; Johnson & Johnson, 1999). *Positive interdependence* is the reliance of group members to build meaningful interactions and work together to achieve the overall learning goal (Fredrickson, Dunlap, & McMahan, 2013). *Individual accountability* is linked to the performance and assessment of each individual with regard to their responsibilities to the group (Johnson & Johnson, 1999). *Promotive Interaction* encompasses certain cognitive and interpersonal dynamics that help promote student success within a team; these include help, support, encouragement, praise, and productive feedback (Felder & Brent, 2015; Johnson & Johnson, 1999). *Social Skills* generally describe interpersonal skills that are linked to leadership, decision-making, trust-building, communication, and conflict resolution (Johnson & Johnson, 1999). *Group Processing* is associated with internal group feedback as encompassed by discussions that reflect the identification and management of social interaction obstacles (Johnson & Johnson, 1999). The elements of this learning model serve as social activities that could help to identify the efficacy of student interaction and overall group dynamics. As the elements in this CLM are inherently anchored in student-led activity, it is therefore also influenced by how students situate themselves within the social dynamics of their group (Fredrickson et al., 2013; Shapiro & Permuth, 2013).

Another model, the Input-Process-Output (IPO) model, provides a framework within which to understand the link between group processes and group results with respect to group productivity (Vornberg, 2013). Derived from the literature on systems theory and organizational behavior, the IPO group productivity model postulates that group outputs (e.g., group performance, productivity) are determined by a combination of group processes (e.g., communication, coordination, conflict management) and group inputs (e.g., individual, group-level, and external factors) (Paulus & Nijstad, 2003; Robbins & Judge, 2015). In reviewing a variety of psychological studies that evaluate why groups that have a high potential for success sometimes fail, Steiner (1972) presented a modified IPO model. In this model, he advanced that actual group productivity is the result of the difference between potential productivity and process loss, resulting in the following formula: $\text{Actual productivity} = \text{Potential productivity} - \text{Process loss}$ (Steiner, 1972). By introducing the concept of process loss, Steiner (1972) incorporates common group barriers – conflict, communication breakdowns, difficulty coordinating – into the overall model, highlighting that group productivity is not simply the accumulation of individual efforts, but the combined success and failures of those interactions in relation to the task.

Within group dynamic processes, motivation has been studied extensively at both the individual and group level by scholars who identify it as a strategic way to enhance cooperation, collaboration, and effectiveness. Individual motivation constructs are based on cognitive and behavioral processes (Amabile, 1983; Bandura, 1982; Locke & Latham, 1990). These processes are understood to interact with group level processes to either enhance or hinder team dynamics (Chen, Kanfer, DeShon, Mathieu, & Kozlowski, 2009). For example, Sheppard (1993) offers an interpretation of individual motivation as defined by task-performance motivation that translates

to overall group effectiveness when individuals are sufficiently engaged and motivated on a specific task. Moreover, the extant literature on work motivation theory emphasizes the roles that individual abilities and traits play in assessing environmental stimuli and internalizing it as motivational (Chen, Gully, Whiteman, & Kilcullen, 2000; Shamir, 1990). In contrast, when individual motivation is weakened within a group, individual negative effects (e.g. narrowed attention span, off-task thinking, rumination, rigid thinking) increase and become a source of stress and tension for overall group performance (Byron & Khazanchi, 2010; Miron-Spektor, Efrat-Treister, Rafaeli, & Schwartz-Cohen, 2011). Individual motivation is weakened when tensions arise between individual and group efficacy beliefs, goal generation processes, affiliation, and belief in the overall group performance (Mullins, 2004).

At the group level, motivation is founded on social and interpersonal processes that interact with individual traits and characteristics. In accordance, research suggests that group level motivation enhances collaboration through the incorporation of distinct elements that activate various facets of individual motivation (Chen et al., 2009). These include, for example, rewards, external and internal incentives, leadership strategies, goal setting and goal generation processes, efficacy beliefs, and performance monitoring, *inter alia* (Chen et al., 2000; Englyst, Jorgensen, Johansen, & Mikkelsen, 2008; Feldman, 1984; Hackman, 1992; Kanfer & Heggestad, 1997). Further, when group members feel more empowered and motivated, there is a subsequent increase in individual performance that contributes directly to overall group effectiveness (Chen, Thomas, & Wallace, 2005; De Shon, Lozowski, Schmidt, Milner, & Weichmann, 2004).

Another important element of the literature regarding effective group dynamics concerns the potency of individual versus group motivation concerning overall group processes. According to Kozlowski and Klein (2000), the effects of group-level factors are more powerful

and pervasive than the individual-level effects, as the latter unfolds languidly and are therefore less likely to influence goal generation and motivation processes at the group-level. DeNisi (2000) echoed this argument suggesting that group goal generation and motivational processes are more potent than the influence of individual motivational processes. Further, Chen and Kanfer (2006) have recently argued that the traditional work motivation theory literature supporting these claims has overlooked a possible cross-level relationship between group-level and individual-level motivational processes that influences overall group performance. To address this issue the authors proposed a theoretical model that illustrates a multi-level, systems perspective highlighting the similarities between group and individual motivation processes (Chen & Kanfer, 2006; Chen et al., 2009).

Group dynamic models have also evaluated the impact of various individual and group processes on creative outputs. One example is embodied in the interactionist model of organizational creativity which suggests that individual creative performance is impacted by situational and dispositional factors pertaining to the group experience which, in turn, influences the overall level of group creativity (Woodman, Sawyer, & Griffin, 1993). Following the line of IPO models, West's (2003) theoretical work provides another model by refining Steiner's (1972) original formula to focus on creativity as the group's overall output. Suggesting that structural and cultural barriers are more a hindrance to creativity than the generation of ideas, in this revised model, inputs are artificially segmented based off of the group structure (e.g., specific individual or group tasks linked to the overall goal) and processes are defined by the composition of the group (e.g., functional or cultural differences). Further, organizational context (e.g., academic, occupational, recreational) is added as part of the equation (West, 2003). Yuan and Zhou (2015) proposed a more recent interpretation of this through a conceptual model theorizing

the impact of power relations on both organizational and individual group member creativity patterns. Within this model hierarchical power relations impact organizational creativity by influencing the divergent and convergent thinking processes created in the interactions at the group level; at the individual level, this model posits that these relations impact individual group member creativity through task and impressions management and motivation (Yuan & Zhou, 2015).

Studies of Communication in Collaborative Settings (Part 2)

To differing degrees, the group dynamic models outlined above suggest that collaboration is impacted by the interactions developed by group members. As the climate of a group is socially constructed and impacted by the discourse exercised between the interactions of the constituents, communication becomes the pith of a group's organizational culture (Thompson Klein, 2005). In turn, communication patterns that assist in establishing common language among members from differing backgrounds are essential for navigating complex, organizational cultures (Levine, Allard, & Tenopir, 2011). Communication is thus essential to engendering collaborative group dynamics in that individual differences – embodied in individuals' power, prestige, status, and influence – are not mitigated or overlooked, but successfully negotiated to allow for a space of mutual exchange between the group constituents (O'Donnell & Derry, 2005; Thompson Klein, 2005). The group-based communication studies literature offered herein provides an illustration of how these dynamics have been investigated through this particular lens.

In one study, Adams and colleagues (2005) explored how disciplinary-based misalignments interfere with overall team conceptualizations regarding task-based ideas. The team under study included ten researchers representing six different disciplines at a large, think-tank institution involved in two related tasks pertaining to the analysis of first-year, science,

technology, engineering, and math (STEM) college student retention issues (Adams, DuRussel, & Derry, 2005). The authors observed this team for over a year, collecting audio recordings and field notes from meetings for the first three months and semi-structured interviews from rotating members of the team for the remainder of the study. Transcripts from these documents were coded and informed by the cognitive concept of mental models and schemas: the former is defined as a reusable mental representational system that is generated within a specific context and reapplied to others to better understand the situation, wherein the latter is defined as a collective system of ideas and expectations (Adams et al., 2005). Results of the analysis indicate that team members had mismatched expectations for how the data analysis for the projects would ensue and misaligned schemas of the task itself making it difficult to progress on any one task. The authors suggest that team members with task schemas that are similarly aligned are more successful in coordinating team efforts as communication between disparate team members is facilitated (Adams et al., 2005). Limitations of the study include the rotating fashion of the team structure, the temporal contributions of certain team members, and the alignment of non-task based schemas (e.g., a shared motivation to improve STEM student experiences).

In another study focusing on interdisciplinary interactions, Hall and colleagues (2005) utilized ethnographic and conversational data from two case studies in the field of entomology (i.e., BugHouse) and architectural design (i.e., Taraval Library). Employing conversation analysis and ethno-methodology on transcribed audio recordings of project meetings, the authors focus on interactional processes of animation in which participants in conversation position themselves with respect to relevant events (Hall, Stevens, & Torralba, 2005). Processes of animation provide guidelines to discern moments in which members of the team are attempting to form representational states aligned with their own discipline and when these states are being

disrupted by others in the conversation (Hall et al., 2005). The results of the analysis suggest that the within the BugHouse meeting, too many moments of disruption of representational infrastructure occur between the entomologists and statisticians of the project to lead to a successful interdisciplinary effort. In contrast, members of the Taraval Library design team are able to restructure moments of disruptions to help re-frame and build on each other's ideas (Hall et al., 2005). The authors conclude that if efforts between interdisciplinary team members include a communicative commitment to address disruptions in representational frameworks between the disciplines, a shared language can encourage more effective collaboration (Hall et al., 2005). A limitation of this study is that the conversations are cross-sectional representations of collaborative efforts, which does not lend insight into the ever-evolving communicative dynamics of long-term teams.

Gressgard's (2012) study adds to group dynamics literature by linking specific communication patterns to group thinking processes. Specifically, the author explored the relationship between different communication patterns and the subsequent thinking processes (ideation vs. evaluation) associated with groups engaged in problem-solving (Gressgard, 2012). Based on the pillars of Media Synchronicity Theory – the ability to enhance communication processes via technological facilitation – the author hypothesized that groups with high levels of communication affordances engage in more productive thinking processes. For this study a total of ninety-five graduate and undergraduate business students were randomly distributed into twenty-seven groups with three to five students each. These groups were randomly assigned to one of three conditions which manipulated the level (i.e. high or low) of synchronicity (allowance of same-time interaction), parallelism (opportunities to contribute without interrupting others), and identification (level of content and process anonymity) within the

group's computer-mediated communication capabilities; groups were given thirty minutes to discuss potential solutions for a business related, group-based problem solving activity (Gressgard, 2012). In a post-activity questionnaire, group members' cognitive style (explorative v. assimilative) and attitudes (preference for ideation v. preference for evaluation) were collected (Gressgard, 2012). MANOVA results from between-subject tests and ANOVA results performed between cognitive style, attitudes and communication patterns provide little support for the anticipated impacts of communication affordances on innovative thinking processes (Gressgard, 2012). Gressgard (2012) posited that the following limitations might have impacted the study: the nature of computer-mediated communication and innovative thinking is not the natural way in which students interact and other factors mitigating communication were not included (e.g., cohesiveness, nature of the task, group norms).

Another study links communication patterns to overall creativity by examining the consequences of how creativity is shaped in discourse for the subjectivities of people working within two creative-based contexts: an opera house and a gaming company (Tuori & Vilen, 2011). Data for the opera house case study was derived from forty-three semi-structured interviews taken during a fifteen month observation of two opera production processes (i.e., planning, production, and performing). For the second case, twenty-one semi-structured interviews were collected from team members that participated in one gaming production round (i.e., pre-production, production, and post-production) (Tuori & Vilen, 2011). Analysis of these transcripts was based on the power relations related to both the organizational structures and to the subject positions identified at each stage of the production process for each organization (Tuori & Vilen, 2011). Results of the analysis indicate four different subject positions: creators of the world (core creative workers), lead singers (employees that have a leading position in

production), artisans (employees who implement the vision), and finalizers (quality assurance and editing workers) (Tuori & Vilen, 2011). The organizational structures reflected in the discourse on creativity illustrate that the communication of ideas is key to navigating the hierarchy between the creators and the rest of the players (Tuori & Vilen, 2011). However, power is related to function and this vacillates between the stages of production and the context of the case studies, where hierarchy is maintained in the opera house but becomes more egalitarian in nature in the gaming company. The authors contended that social notions of elitism with regards to creativity may influence the overall contribution of ideas from key team players at different stages (Tuori & Vilen, 2011). Although this study provides a link between how communication patterns become social practice as the product of group dynamics, it is limited in the contextual nature of both case studies (i.e., generalizability of findings) as well as overlooking key factors related to motivation and efficacy with regards to idea contribution.

In another communication study, Wolfe and Powell (2009) researched the gender difference in how engineering and non-engineering students perceived common speech patterns within collaborative settings. For this study, five hundred and twenty-two undergraduate students enrolled in either an introductory engineering or a general education English course participated in a survey which asked them to rate three typical male and three typical female speech patterns (Wolfe & Powell, 2009). Each example expressed some form of minor complaining associated with group work; for example, wherein male speech patterns represented externally-directed criticisms, female speech patterns represented self-directed criticisms (Wolfe & Powell, 2009). The names on the examples did not necessarily indicate a correlation between the gender of the speaker and the speech pattern that was represented (e.g., a female name on a typical male speech pattern example). Regression analysis was conducted on each survey item

using the SAS general linear module (Wolfe & Powell, 2009). The findings indicate that male engineering students were significantly harsher than other groups (including engineering females and non-engineering males) when rating female typical speech patterns; this bias was consistent regardless of the speaker's gender (i.e., the name on the speech pattern example) indicating perhaps that it is the self-deprecating nature of the complaint rather than actual gender bias (Wolfe & Powell, 2009).

A follow up study was conducted by the same authors that investigated female interpersonal communication patterns within a collaborative, engineering context. In this study, Wolfe and Powell (2014) employed discourse completion interviews with twenty-three female engineering professionals and nineteen female undergraduates. These interviews asked participants how they would respond to collaborative environments in which a colleague was dominating the direction of the project. Findings from this study indicate that wherein engineering female students tended to avoid conflict, professional female engineers employed a variety of techniques to affect positive change including: the use of structured language, semi-formal procedures, presenting solutions, and avoiding the use of emotional language indicative of feelings (Wolfe & Powell, 2014). Moreover, professional female engineers utilized mechanisms that appealed to their team's overall goals and, when necessary, employed flattery to accomplish their main objective – a technique which appeals to the self-boosting nature of typical male speech patterns (Wolfe & Powell, 2014).

Critical Social Theory Scholarship on Knowledge Construction (Part 3)

What the above literature illustrates is that collaboration is a complex and multifaceted issue that can be studied in a multitude of ways. Group dynamic models offer differing perspectives on how system based processes can impact the efficacy of individual and group processes within a collaborative environment. The communication studies literature offers a lens

with which to understand how group dynamics are impacted by individual communication patterns. Both areas of literature implicate the complexity of social exchanges that leads directly into the critical social theory literature presented herein.

In chapter one I briefly introduced Derrida (1976, 1993) and Foucault's (1972) interpretation of how language and knowledge construction is influenced by power and social constructs. These interpretations were offered as examples of critical scholarship rooted in a postmodern, poststructuralist, and anti-essentialist interpretations of the nature of language. Here I expand on Foucault's (1972) interpretation and introduce how other critical conceptualizations of power have advanced the implications of identity and discursive practices on knowledge construction. I label this section *Knowledge Construction and Discourse*. The following section (*Knowledge Construction and Learning*) expands on these contributions and introduces literature that analyzes how the social context and power dynamics within the sphere of schooling influences students' understanding of what constitutes legitimate knowledge. In the *Feminist and Gender Theory* section I present work that has helped to shape an understanding of how knowledge construction has traditionally excluded knowledge constructed from and by specific, socially constructed, contextual markers (i.e., gender). I contend that the literature from all of these sections provides the foundation necessary to situate this dissertation within the conceptual and analytical framework presented in chapter one. The purpose of outlining this literature is ultimately to understand the history and foundation of work that has influenced *critical discourse analysis* and has therefore provided a basis for understanding collaboration through the social, critical, and postmodern theories that focus on the relationship between social interaction and power.

Knowledge Construction & Discourse (Section 1)

The scholars presented in this section provide different perspectives from which to understand the theoretical mechanics of how power influences social identity and thus social interaction and knowledge construction. As noted, I re-introduce Foucault in this section as his work on knowledge, discourse, and power played a large role in how the scholars of the New Literacy Studies interpreted the role of language within a socio-cultural context (Gee, 2008; Rogers, 2004). Laclau, Mouffe and Hall are then integrated as other examples of how this understanding of discourse (as intertwined with social and power dynamics) can influence what knowledge is valued or disregarded within specific contextual frames and social interactions.

Foucault. Michel Foucault, a French scholar writing within an anti-essentialist tradition, was a prolific writer who provided comprehensive scholarship with respect to understanding knowledge, truth, and power as they relate to discursive practices. Described as determinedly historical, he utilized critical social theory to question the production and regulation of knowledge through language domains that categorized what could become truth (Barker, 2012; Foucault, 1972). With regards to pedagogy and collaboration, Foucault's work allows for a re-examination of discursive practices that operate as a form of power and influence the production of knowledge. Discourse is, as Foucault (1977, 1982) suggests, the product of social struggle, ideological conflict, and power relations. In this struggle, Foucault (1982) outlines three concepts associated with discourse and the formation of knowledge: *discursive formation*, *discursive production*, and *discursive practice*. *Discursive formations* are communication patterns through which objects and practices acquire meaning across a large range (Foucault, 1972; Foucault & Nazzaro, 1972). *Discursive production* is associated with subjectivity and dictates the positions from which individuals make sense of the world (Foucault, 1977; Mills,

1997). *Discursive practice* regards the reproduction of a subjective social order based on discourses of power in which knowledge is regulated (Barker, 2012; Foucault, 1977; Foucault & Nazzaro, 1972).

Foucault's work concerning discourse and the subject as it pertains to social interaction and knowledge thus helps generate concepts for thinking through questions concerning pedagogy and the construction of knowledge in collaborative spaces (Anderson, 2013; Dehli, 2013; Foucault, 1982; Mills, 1997). By understanding the modes of discourse that regulate the production of knowledge and the positions from which individuals interpret that knowledge, Foucault (1982) outlines the role of subjectivity in the production of truth. For Foucault (1982), "It soon appeared to me that, while the human subject is placed in relations of production and of signification, he is equally placed in power relations which are very complex" (p. 778). Thus, discourse is regulated by the language employed rather than direct insight or ability, making knowledge a social construct (Dehli, 2013; Foucault, 1982). Knowledge, as a product of social interactions and regulated language, is thus also a product of multiple constraints and negotiations (Foucault, 1972; Mills, 1997). Within a constructivist classroom, Foucault teaches us that confronting the individualization of discourses and the power relations in which these negotiations manifest is unavoidable and part of the social constructs related to *truth* (Dehli, 2013; Foucault, 1982).

To help us understand how power is interwoven into the discourse formed by individual exchanges, Foucault (1982) contends that the phenomena of power is evident in how such a force makes humans into subjects of discursive practice. He argues that as subjects formed by the complex negotiations of power, discourse provides the forms and practices in which to produce and provide signification for these power relations (Foucault, 1982). For Foucault (1982) power

has the ability to categorize and mark individuals by imposing a “law of truth” on which those individuals are socially recognized, in consequence rendering individuals into subjects of discourse (p. 781). Within this perspective three types of struggles associated with power exist: against domination (e.g., ethnic, social, religious), against exploitation, and against subjection (Foucault, 1982). Expanding on the nature of discursive formations and the struggles associated with power, he develops the idea that where there are relations of power there exists struggle; yet, individuals are not trapped by this power as subsequently it is historically and socially situated and can hence be modified (Foucault, 1978).

Truth and knowledge are thus inherently intertwined in these discursive struggles as it is through these elements that power has influence (Foucault, 1980, 1982). To further this point, Foucault (1982) contends that language is the site where struggles manifest and truth is a product of the multiple constraints induced by constant negotiation. The knowledge that is produced from this truth is consequently a result of power struggles rather than distinctive insight or innate ability (Foucault, 1980, 1982). Foucault (1993) illustrates the potential of the individualization of discourses as a form of modifying truth and knowledge. The known and reliable criteria by which these modifications can occur are the linguistic system and the articulation of the identity of the subject (Foucault, 1993). In accordance, he posits that individuals, as subjects, wield the tools necessary to discipline or negotiate power within their own historical and social sites of struggle (Foucault, 1978, 1980, 1993).

Laclau & Mouffe. Ernesto Laclau and Chantel Mouffe, political theorists well known for their anti-essentialist works regarding ideology, discourse, and hegemony, are co-authors of the book *Hegemony and Socialist Strategy: Towards a Radical Democratic Politics* (Barker, 2012). In this text, Laclau and Mouffe (1985) revoke the traditional, structural conceptions

concerning subjectivity found in Marxist theory. To do this, they build on the work of Derrida which emphasizes the influence of *differance* (i.e., the continual deconstruction and deferral of meaning) within the production of meaning and argue that such meaning is inherently unstable (Laclau & Mouffe, 1985). Due to this instability with respect to meaning, identity is therefore contingent on multiple, socially constructed descriptions and submitted to continual contestation that is temporarily united through *articulation* (Laclau, 1995; Laclau & Mouffe, 1985). For Laclau and Mouffe (1985), *articulation* is inherently intertwined in discourse. Articulation is defined as the connection between distinct, discursive elements within specific contextual and temporal conditions (Barker, 2012; Laclau & Mouffe, 1985). Moments (differential positions understood as products of these links) and elements (mere differences that are not expressly articulated) are then distinguished as part of these articulatory practices (Laclau & Mouffe, 1985). Within articulatory practices, then, the social has no fixed origin and differences are not determined, as temporary and strategic alliances can be articulated through various discursive constructions (Laclau, 1995; Laclau & Mouffe, 1985).

As collaborative learning is founded on social interaction and building upon the meanings derived from discursive practices, *articulation* furthers the literature on collaboration by outlining a theoretical method by which to comprehend shifts in meaning and the direction of the knowledge construction within student groups (Laclau, 1995). What *articulation* offers is an understanding of the connection between students' sutured identities as a result of their experience within their interdisciplinary, group setting (Barker, 2012; Laclau, 1995). To clarify, the premise of collaboration is to expose students not only to other perspectives but to arguably conceive moments and elements within their interactions that create instances of new knowledge (Anderson, 2013). Consequently, as knowledge is constructed and the value of these

contributions are hypothetically based on the perspectives provided by individual experiences and the identities linked to these experiences, it is important to note that the identity of the students making these contributions is dependent on the articulatory practices they encounter (Barker, 2012; Thayer-Bacon, 1995, 2013).

Hall. Stuart Hall, a West-Indian British scholar, furthers the theoretical literation on discursive practice by building upon the anti-essentialist notions of *articulation* and discourse to emphasize the multifarious and malleable nature of identity as a social construct (Barker, 2012; Hall, 1993, 1996). Similar to Laclau and Mouffe's (1985) position on identity, Hall (1996) states, "Identities are thus the points of temporary attachment to the subject positions which discursive practices construct for us" (p. 19). To illustrate how social objects of knowledge are produced and disseminated Hall (1993) – via an analysis of television messages - outlined a *four-stage theory of communicative exchanges*. In this framework he suggests that communicative messages are not open to interpretation, but rather guided through the relatively autonomous stages of production, circulation, use (i.e., distribution or consumption), and reproduction (Hall, 1993). If no meaning is constructed within the production and circulation phrase, there is no guarantee of consumption or reproduction of the message (Barker, 2012; Hall, 1993). Hall (1993) thus stresses that, "The 'object' of these practices is meaning and message in the form of sign-vehicles of a specific kind organized, like any form of communication or language, through the operation of codes within the syntagmatic chain of a discourse" (p. 508). Thus, Hall (1993) establishes that messages are encoded and decoded based on the degrees of symmetry (i.e., understanding and misunderstanding) developed and the degrees of identity and non-identity of the participants in the communicative exchange. The more "lack of equivalence" between these

factors, the higher the level of “distortions” or “misunderstandings” between subjects (Hall, 1993, p. 510).

Hall (1993, 2000) links this conjecture back to the malleable nature of identity and suggests that the regulations regarding such communicative exchanges dictates whose knowledge is then valued and whose is placed at the margins. To illustrate this point, Hall (1993) iterates that, “Discursive ‘knowledge’ is the product not of the transparent representation of the ‘real’ in language but of the articulation of language on real relations and conditions” (p. 511). Thus, Hall’s (1993, 2000) work, with regards to collaborative learning, provides a template for not only understanding how student’s social identities influence knowledge construction, but how these social constructs impact the interpretation and internalization of this discourse when communicated and encoded into meaningful constructs (Hall, 1993, 2000). Understanding Hall’s *four-stage theory of communicative exchanges* framework provides insight as to why students within collaborative learning environments select certain discursive patterns over others and what social identities or constructs might be guiding this process. Further, this framework sheds light on social practices that are emphasized as students negotiate discursive practices in the pursuit of constructing new knowledge.

Knowledge Construction & Learning (Section 2)

Collaborative learning spaces necessitate that students be active learners in an effort to construct new knowledge through social interaction (Anderson, 2013; Brooks, 2013). What we learned from the scholars of the previous section is that such interaction is situated within social contexts which inherently have power dynamics that influence identity and knowledge construction. In this section, I focus on scholarship that centers on academic or learning contexts. This scholarship integrates sociological theories that understand schools as socially

situated spaces saturated with social realities and power dynamics that influence social interaction (Giroux, 1997). Students' school experiences may, in consequence, be potentially tainted by subtleties of power that influence their agency to be willing to contribute their ideas in this space (Giroux, 1997; Hall, 1996).

The scholars featured in this section – Freire, Horton, Bourdieu, Giroux, and hooks - have furthered the theoretical literature in this respect by providing insight into how the contexts within which students learn influences their subsequent development as interactive human beings. What these scholars offer through their contributions is an idea of the incomplete student working within a constrained academic landscape. These scholars also act as inspiration as to how instructors in a collaborative environment can harness the academic space to remedy past asymmetries and bring forth student empowerment which is vital to the construction of new knowledge in constructivist spaces (Anderson, 2013; Brooks, 2013; hooks, 1994). With respect to this dissertation, then, this literature is valuable in understanding the reservations students face when tasked with contributing to the construction of new knowledge in a collaborative space (Anderson, 2013; Bruffee, 1992). I turn to these scholars for insight to better understand why, within an academic setting, students may or may not be willing to put forth their full potential within a collaborative learning environment.

Freire & Horton. The focus of this scholarship is centered on the liberation of the student from knowledge that has previously been a constraint. Within this context, power is entangled with education in that it is associated with the perception of who can hold, generate, and understand knowledge and, in turn, what type of knowledge is worthy of knowing and reproducing (Freire, 1970; Horton, 1998). For example, in analyzing what he describes as the banking method of education - where teachers deposit knowledge into passive students – Paolo

Freire (1970) in *Pedagogy of the Oppressed* argues that such a system is oppressive and dehumanizing as it does not permit student to reach their full potential. Instead, it asks students to be mindless, unthinking beings, trained to be mere receptacles of information rather than processors and creators of knowledge (Freire, 1970; hooks, 1994). In this model, the oppressed (i.e., students) are not free because they are not allowed to reach their full humanized form, while the oppressors (i.e., those enforcing the system) are not free because they are bound by a system that makes them become the dehumanizer (Freire, 1970).

What Horton (1998) brings to this conversation is a rich, detailed account of the potential that recognizing these asymmetrical social discrepancies have to affect change within the community. In his work, Horton (1998) delineates the struggle between learning as a form of reproducing certain types of knowledge versus learning for the ultimate objective of personal growth. He insists that such delineated demarcations of what comprise standards of learning and legitimate knowledge has negative consequences for communities that do not fit within these frameworks: “One of the lessons I’ve learned about bureaucracies is that although they are not made up of evil people, they can do something bad to good people” (Horton, 1998, p. 146). He instead suggests that the educative process should be more organic, allowing more change to be generated from the intelligent ideas that are constructed by other forms of knowledge not already legitimated through society (i.e., community based knowledge versus academic research). Horton (1998) posits that, “The educative process must be organic, and not an assortment of unrelated methods and ideas” (p. 130). Horton’s (1998) work essentially warns against the narrow-minded form of thinking that is often tailored by organizations and institutions that are so tied to their structure, they are incapable of seeing the value in ideas that do not fit nicely into their prescribed notions what is correct.

Bourdieu & Giroux. Bourdieu and Giroux further the notion of the underlying effects of power within the school system on student development through their work on the reproduction of capital and the favoritism of certain epistemological truths, respectively. For Bourdieu (1973) power is intertwined with the American educational system in that particular forms of social and cultural capital are successfully favored and reproduced as the product of the system. By applying this theory to American school settings, he illustrates how the curriculum, mannerisms, and socialization processes learned in American schools favor the dominant classes and thus serve as part of the legitimization process to distribute cultural capital that favors the certain classes over others (Bourdieu, 1973). Giroux (1997) expands on this idea by analyzing epistemological favoritism in schools and providing a theoretical critique on the culture of positivism and technocratic rationality. By favoring an idea of knowledge as strictly derived from logic and reason, Giroux (1997) argues that students are being limited in their own capacity to create knowledge through personal, social, political, and historical connections. Humans, he argues, are multifaceted and should function as *border-crossers* that embrace difference and seek to move continuously through physical, cultural, and social borders in an effort to expand their own understanding (Giroux, 1997, p. 96). In accordance, Giroux (1997) calls for instructors to become transformative intellectuals that refuse to reproduce cultural and social injustices by taking a stand against oppressive practices and empowering their students to think critically.

hooks. Writing from the African American experience in American schools, bell hooks has contributed to this literature through works focused on race, ethnicity, and the politics of identity within education, learning, and pedagogy (Barker, 2012; hooks, 1993). For hooks (1994), knowledge is meant to be empowering not static. Thus, inspired by the works of Freire - which calls for teachers to bring students to a critical consciousness through education – coupled

with her own experiences with the destructive consequences of knowledge built upon the structures of “white supremacist capitalist patriarchy,” hooks (1993) developed the notion of *engaged pedagogy* (p. 235). The purpose of engaged pedagogy is to help students confront and transgress boundaries regarding knowledge that they would not do so otherwise to transform learning into a unique opportunity to critically evaluate knowledge (hooks, 1993, 1994). A core assumption of engaged pedagogy is that education is dependent on practices which can either be associated with conformity or those of promise and freedom (hooks, 1993). To generate the latter, she encourages the use of critical theory as a tool to combat the reduction of people to their social constructs (hooks, 1993). For this to occur teachers must embrace certain attitudes that teach to transgress, including: valuing student expressions, understanding students as individuals with unique experiences, and being willing to commit to a flexible agenda that does not reflect biases or reinforce systems of domination (hooks, 1994). In accordance, hooks (1994) stresses that engaged pedagogy calls on teachers to allow students to take risks and make teaching practices “a place of resistance” for students (p. 21).

Feminist Scholarship & Gender Theory (Section 3)

The scholars hitherto outlined have provided a basis by which to understand how knowledge can be constructed through discourse, how power influences such construction, and how certain types of knowledge can be favored within various learning processes. Acknowledging that the critical scholarship on knowledge construction and power is vast, I now focus on feminist and gender theory scholarship regarding this subject because it provides an important avenue with which to understand how these mechanics are interpreted from a particular socially constructed identity (i.e., gender). This area of study, “asserts that sex is a fundamental and irreducible axis of social organization, which, to date, has subordinated women to men” (Barker, 2012, p. 290). Subsequently, such work is often concerned with understanding

gender as an organizing principle of social interaction and critically investigating the power dynamics that assist in reproducing this dominant narrative (Barker, 2012). In connecting this back to other sections within this literature review, I see how the feminist work outlined herein links to the findings presented by Wolfe and Powell (2009, 2014) concerning gender typical speech patterns. For instance, in suggesting that professional female engineers often opt to avoid language that is considered emotion-laden speech, there is a suggested preference for discourse that leads to knowledge construction that does not integrate typical female speech patterns reflective of emotion (Jaggar, 1998; Wolfe & Powell, 2009, 2014).

Within the context of this dissertation, gender as a social marker is considered important as the two disciplines represented in the CIDI course – nursing and chemical engineering - are arguably representative of traditional gendered social norms, roles, and activities (Coleman, 2013; National Research Council [NRC], 2010; Watt & Eccles, 2008). For example, nursing has often been associated with traditional feminine gender roles in that the norms and roles of nurses are centered on patient care, service roles (e.g., listening, validating, helping), and supportive interactions (e.g., submission, dependency) (Coleman, 2013; Evans, 1997, 2002). As a profession with delineated hierarchical roles (e.g., top-down, doctor to nurse interactions) it competes against traditional, Euro-westernized notions of masculinity wherein competition and leadership are significant determinants of masculine success (Evans, 1997, 2002; Larson, 2013). Thus, although the number of males entering into the nursing profession has steadily risen over the past decade, the profession is still predominantly female (Coleman, 2013; Larson, 2013). In contrast, engineering is still a male dominated field which is associated with the norms and roles of traditional Euro-western masculine gender social identities (Watts & Eccles, 2008). For Heilman (2012) gender stereotyping can account for this disparity in that professions like

engineering are often thought of as rational, logical, and less emotional – traits traditionally associated with a Euro-western conceptualization of masculine social identities.

The purpose of integrating this section within the literature review for this dissertation is to highlight how social norms connected to gender typical stereotypes can influence social interaction and knowledge construction. These theories, in turn, provide yet another foundation for which to integrate into the critical discourse analysis associated with this work. I begin this section with a description of Jaggar's (1992) exploration of the construction of knowledge and her discussion of the role of emotions in this activity. I then describe Belenky and colleagues' (1997) seminal work, *Women's Ways of Knowing: The Development of Self, Voice, and Mind* (hereafter *Women's Ways of Knowing*). This provides the basis for understanding Thayer-Bacon's (2000, 2003) *constructive thinking* and *relational "(e)pistemologies"* and Tarule's (1996) *collaborative thinking* construct – ideas inspired by this foundational piece.

Jaggar. In her work, *Love and Knowledge* (1992) Allison Jaggar provides a historical and epistemological exploration regarding the place of emotions in the construction of knowledge as well as their association with the feminine perspective. She furthers this argument in her work entitled *Sexual Equality as Parity of Effective Voice* (1998), which elucidates the social and scientific value of emotions and therefore the feminine voice. To understand the divergence of emotion from knowledge construction, Jaggar (1992) first provides a definition for emotions:

Emotions... are wrongly seen as necessarily passive or involuntary responses to the world. Rather, they are ways in which we engage actively and even construct the world. They have both mental and physical aspects, each of which conditions the other. In some

respects, they are chosen, but in others, they are involuntary; they presuppose language and a social order. (pp. 152-153)

As not all emotions are universal, it can be presupposed that certain emotions, if not all, are a consequence of experience and cultural exposure (Jaggar, 1992). To further this point Jaggar (1992) explains that under specific socio-cultural circumstances, specific groups of people, including women, were awarded more opportunities to embody this aspect of the human experience via specific social roles and norms. She contends, “Women appear more emotional than men because they, along with some groups of people of color, are permitted and even required to express emotion more openly” (Jaggar, 1992, p. 157).

Jaggar (1992) refines the socially constructed understanding of emotions by acknowledging their culturally laden implications and linking this association to increased judgment and evaluation. This judgment, in turn, becomes a vital acumen for the construction of knowledge (Jaggar, 1992, 1998). In this regard emotions are working in confluence with cognition in that they shape experiences in as much as experiences define the construction of emotions (Jaggar, 1998). However, the role that emotions have played in helping to direct inquiry and guide research, for example, has long been severed by positivist traditions that argue that knowledge must be formed from objective measures (Jaggar, 1992). As a result, there is misalignment between the role emotions are supposed to play and the role that they actually play in knowledge construction, with the former often outweighing the latter (Jaggar, 1998). This misalignment produces what Jaggar (1992) has labeled *outlaw emotions*: those that are “conventionally unacceptable” or run counter to socially accepted norms (Jaggar, 1992, p. 160). As women often have to suppress these outlaw emotions in order to garner respect in the

knowledge construction process, Jaggar (1992) argues that the result is often the silencing of women's voices in this process. She acknowledges that until women achieve some form of parity of effective voice, they will continue to be discredited, dismissed, and silenced in social contexts in which their gendered and emotion-laden speech is devalued (Jaggar, 1998).

Belenky, Clinchy, Goldberger, and Tarule. The work of Belenky and colleagues (1997) in *Women's Ways of Knowing* is seminal piece in which the authors' purpose is to understand how women construct knowledge within the constraints of varying social contexts. This work furthers the idea of various types of learning by postulating that learning is congruent to the development of voice, self (identity), and mind, specifically as it pertains to the experiences of females (Belenky, Clinchy, Goldberger, & Tarule, 1997). The premise of this work was based on a psychological study of human thought in which the authors noted that women interpret information differently than men, thus impacting their learning. In particular, while conducting student interviews, a common theme among female students was to, "speak so frequently of problems and gaps in their learning and so often doubt their intellectual competence," that the authors began to draw a connection between the simultaneous experience of academic learning and individual situatedness (Belenky et al., 1997, p. 4).

In developing this analysis, Belenky and colleagues (1997) posited that women experienced four types of learning – *received*, *subjective*, *procedural*, and *constructed knowledge* – all which impacted their inner voice, idea of self, and identity. With regards to received knowledge, the authors state that women acquire knowledge as passive observers, or rather listeners, to those around them, hence receiving information and, in turn, denying their own voice (Belenky et al., 1997). With their study, Belenky and colleagues (1997) illustrated that the female participants often negated their own voice for voices that hold more social authority,

choosing to receive knowledge rather than create it. Subjective knowledge is moving from a passive receptor to an active interpreter of knowledge, specifically that from an internal source – i.e., “knowing with your gut” (Belenky et al., 1997). This type of knowing is linked to the development of voice in which subjectivists try to avoid the words of others (i.e., received knowledge) in an attempt to come back to a better understanding of their own voice (Belenky et al., 1997).

Procedural knowledge encompasses two distinctive forms of knowing: separate and connected. Wherein separate knowing implies separation from the object of knowledge and mastery of it (e.g., doubting, thinking critically), connected knowing implies a personal acquaintance with an object and a thorough understanding of a concept (e.g., accepting ideas, using personal knowledge) (Belenky et al., 1997). For Belenky and colleagues (1997),

Connected knowing is not exclusively a female voice. We all encounter men, in person and in print, who speak in this voice. Separate and connected knowing are not gender-specific. The two modes may be gender-related. It is possible that more women than men tip toward connected knowing and more men than women toward separate knowing. Some people, certainly, would argue that this is so, but we know of no hard data (to use a favorite separate-knowing term) bearing directly on the issue, and we offer none here because we interviewed no men. (pp. 102-103)

Finally, constructed knowledge is a reflection of growth of self in which women have learned to speak in a unique and authentic voice that is representative of their own experiences and understanding (Belenky et al., 1997). Constructed knowledge is an integration of various voices

developed within the unique experiences that combines all the forms knowledge described above (Belenky et al., 1997).

What this study contributed to the literature was a unique perspective stemming from a gendered interpretation of knowledge construction. This study arguably brought attention to the fact that learning can be categorized and will differ depending on the perspectives and experiences of the student. The insights garnered from this study also brought to light power imbalances within specific socio-cultural environments in which women's voices were subdued, negated, or ignored for more favorable, authoritative perspectives representing socially legitimated forms of knowledge (Belenky et al., 1997). Although their work was later revised to include the conceptualization of these terms from more diverse perspectives, its contribution remains in how it changed the course of women's studies, feminist pedagogies, and feminist theory (Belenky et al., 1997; Goldberger, Tarule, Clinchy, & Belenky, 1996).

Thayer-Bacon. As a cultural studies scholar and American philosopher, Barbara Thayer-Bacon's work often draws attention to the asymmetries associated with traditional philosophies that favor a particular view of how knowledge is constructed. Thayer-Bacon's (2000) work on *constructive thinking*, in particular, provides insight into the various cognitive and communicative tools necessary for the newness associated with knowledge construction to occur. This term is inspired and founded on Belenky and colleagues' (1997) concept of constructive knowing – a term that emphasizes,

the idea that thinking is something we actively construct within ourselves, as psychologists such as Vygotsky (1934/1962) and Piaget (1980) have argued, as well as its

emphasis on the idea that thinking is socially constructed, as Berger and Luckman (1966) and other sociologists (Mead, 1934) have argued. (Thayer-Bacon, 2000, p. 5)

Constructive thinking in this sense is the ability to shape and change one's understanding of the world through his or her interaction and exposure to various ideas, people, and environments (Thayer-Bacon, 2000).

This type of thinking occurs through the combination of four complementary tools: reasons, emotions, intuition, and imagination. In describing these tools, Thayer-Bacon (2000) states, "Reasons, emotions, intuition, and imagination overlap and influence each other continually, and it is really only possible to constructively think by using them all together" (p. 4). Harnessing a quilting bee metaphor, she offers that the utilization of each of these tools allows for the construction of knowledge to be shaped from differing angles (Thayer-Bacon, 2000). For example, she explores Benhabib's (1992) concept of *enlarged thinking* (described as the willingness to reason and hear from another's point of view) and Greene's (1993) notion of *wide-awakeness* (a sensitivity to experience the world in new ways) and underscores that such ideals are fostered through our emotions and imagination (Thayer-Bacon, 2000). Such skills, however, are not innate, but rather "painfully acquired" (Thayer-Bacon, 2000, p. 107). In this respect in order to be able to engage in *enlarged thinking* or *wide-awakeness* relational and communication skills are essential as they allow individuals to understand intuition and emotion, and, subsequently develop imagination and reasoning - the combination necessary to delve into constructive thinking (Thayer-Bacon, 2000).

Furthermore, in her work *Relational "(e)pistemologies"* Thayer-Bacon (2003) provides philosophical insight into how working with others builds the capacity of individuals to

understand and interpret the world in new ways – in effect, learn. Her arguments further the abovementioned descriptions of learning by positing that interaction between humans is an inherent part of the development of human thought. Specifically, Thayer-Bacon (2003) argues, “that as individuals-in-relation-with-others, the relationships we experience are transactional relations which are embedded within larger social contexts” (p. 128). For her learning is indeed multifarious but also dependent on the interactions established, the social relationships developed and maintained over time, and the interpretations that are fostered by these dynamics (Thayer-Bacon, 2003).

Tarule. Jill Tarule’s work as a feminist scholar lead to her contributions is a co-author of *Women’s Ways of Knowing* as well as a co-editor of *Knowledge, Difference, and Power: Essays Inspired by Women’s Ways of Knowing*. The purpose of the latter was to revisit and revise the themes introduced in *Women’s Ways of Knowing* in order to integrate the voices of women who were not represented in the first study. In one of her contributions to this work Tarule (1996) introduced her conceptualization of *collaborative ways of knowing*. For Tarule (1996), collaborative ways of knowing stems from a desire to not homogenize women’s voices, but rather recognize the diversity inherent in the voices that contribute to dialogue. This dialogue is what makes meaning and therefore knowledge construction through the course of social exchanges in the form of conversations possible (Tarule, 1996). Particular to these exchanges is the understood assumption that as knowledge is being produced, reproduced, and contested within a social environment that is ever-changing, such knowledge is also therefore unstable (Tarule, 1996). This type of knowing is inspired by a re-conceptualization of the subjective and constructive knowledge present in *Women’s Ways of Knowing* within what Tarule (1996) calls *voices in dialogue* (p. 274).

For Tarule (1996), the importance of collaborative knowledge is the emancipatory nature of the environment in which these voices in dialogue are acting. That is, in understanding that knowledge is socially constructed through these exchanges, women's sense of self and knowing is continuously influenced by their positioning within these exchanges (Tarule, 1996). In developing her description of collaborative knowing Tarule (1996) integrates key aspects from social constructivist learning theories derived from the work of Piaget and Vygotsky. Through these scholars she emphasizes that the value of collaborative knowing is based on an appreciation for a diversity of voices that are empowered to speak up, speak out, or say what they mean; this, in turn, necessitates that the idea of the all-knowing keeper of knowledge must be dismantled in spaces where there exist voices in dialogue. By emphasizing the unique value of varying voices in dialogue in an effort to create collaborative knowledge, Tarule (1996) contends that there must be a larger social movement that pulls away from the notion that only a single voice representing a singular framework can construct knowledge.

Connecting this to *critical discourse analysis* (Situating this Dissertation)

As noted in chapter one, a key assumption of the *critical discourse analysis* conceptual framework for this dissertation is that language is not neutral, nor is it stable. This assumption draws heavily from critical social theory scholarship and a Foucauldian interpretation concerning the role of language and power in knowledge construction (Fairclough, 2013a; Gee, 2004; Rogers, 2004). The New Literary Studies movement from which *critical discourse analysis* was born is inspired by this new conceptualization of language as a socially constructed medium by which actions, social dynamics, and power relations are expressed and converted into social reality (Gee, 2004, 2008; Rogers, 2004). Born from a unique synthesis of formal and functional linguistic and structural methods, cognitive sciences, postmodern literacy theory, and critical

social theories, this approach to understanding language attempts to marry communicative exchanges (i.e., discourse) to social realities (Riessman, 2008; Rogers, 2004). In doing so, this conceptual framework integrates key assumptions from the scholarly traditions highlighted in this literature review and provides a framework within which to situate the pedagogical implications that are drawn from this dissertation.

As the contextual framework for this dissertation is situated within a collaborative learning environment, I wanted to outline the literature which inspired the assumptions of *cda* that allow for an analysis connecting how these interactions manifest within a socially constructed context. Part one of this literature review introduced seminal group dynamic models to provide a robust theoretical background regarding the social interactions this *cda* will explore. The second part of this literature review presented key and current scholarship within the communication studies literature in order to illustrate how these exchanges affect the efficacy of social interaction. These examples introduced the social dynamics central to the theories explored by critical social theory scholars presented in the following section. I posit that the section outlining the work of critical social scholars in knowledge construction and discourse, knowledge construction and learning, and feminist and gender theory are perhaps the most vital for positioning this dissertation as a cultural studies project. This is because this scholarly work provides the inspiration for the formation of the movement that produced *critical discourse analysis*. In being an interdisciplinary approach to understanding discourse and analyzing such exchanges in a critical manner, the purpose of a critical discourse analysis is to understand the power relations inherent in language that drive the social realizations derived from these exchanges (Rogers, 2004). Understanding these theories offers a platform with which to better

understand the theoretical foundations within which the conceptual and analytical frameworks for this dissertation are anchored.

Specifically, what Foucault, Laclau and Mouffe, and Hall offer is a robust understanding of how discourse - as socially situated and constructed - impacts identity, subjectivity, and, subsequently, knowledge construction and truth. These scholars provide a glimpse of the underlying significance of power dynamics within this process and offer a strong theoretical rationalization for the ways these dynamics manifest within socially constructed contexts. The scholars represented in the section on *Knowledge Construction and Learning* bring this conversation to the central activity with which this dissertation is concerned: learning. The focus in this section is to understand the sociological factors that have influenced how students have understood the construction of knowledge within their own learning experiences. What Freire, Horton, Bourdieu, Giroux, and hooks offer is theoretical insight in how certain habits formed within the realm of schooling and the practice of learning have instilled students with an understanding of their role in this activity and what counts as legitimate forms of knowledge. I integrate *Feminist and Gender Theory* literature into this critical scholarship to highlight how knowledge construction can be dominated by one perspective and therefore negate the possibility of its construction by those that do not fit within the dominant narrative. As the two main disciplines represented in the CIDI course –nursing and chemical engineering – are associated with traditional gendered social roles and norms (i.e., feminine social roles for nursing and masculine social roles for engineering) it is important to emphasize the various ways that these social gender dynamics can influence knowledge construction (Coleman, 2013; NRC, 2010). What Jaggar, Belenky and colleagues, Thayer-Bacon, and Tarule illustrate is that experiences

and social contexts implicate the development of voice, which, in turn, influences how women and men contribute to knowledge construction processes.

Ultimately, what this literature review exemplifies with regards to knowledge construction within a collaborative, social environment is that it can be studied in a multitude of ways, through all of these various theoretical traditions, as well as through its group dynamics and through its communicative processes. If I apply group dynamic models to collaboration, I understand that such models attempt to explore social interaction through the way group members are structured within the group environment: that is, understanding how group members' different positioning and leadership skills influence overall group dynamics and effectiveness. Communicative studies literature, on the other hand, explores these dynamics at a different level. Instead of looking at group members' positions and leadership ability within a group environment, this scholarship looks at the communication patterns developed by group members as they navigate different interactions. Effective communication leads to success wherein communication obstacles lead to challenges hindering the main objective of the collaboration. Finally, the critical social theory literature attempts to analyze the discourse developed from social interactions through the contextual and social markers that influence such dynamics (i.e., power, identity, and subjectivity). That is, not necessarily analyzing the effectiveness of the communication but rather understanding how such patterns are developed and influenced by larger social markers which may be empowering or hindering communication in the first place.

With this dissertation, I am interested in the third lens: understanding the why and how of the social influences that impact knowledge construction in an interactive space. To do so, I employ a critical lens to student discourse produced within a collaborative learning environment

to understand a central aspect of this form of analysis: how power is produced in these discursive exchanges. Although following a line of analysis aligned with each of the angles presented in this literature review is not possible, I do contend that by situating this dissertation with a *critical discourse analysis* conceptual framework I can integrate several of these aspects (i.e., socio-cultural, critical, and linguistic approaches) to understand my central research objective within a more holistic perspective. By analyzing the student discourse represented in the archival data from the CIDI course as dynamic, instable, and socially constructed, I can utilize Gee's (2004) analytical framework to make connections between this text and the social realizations derived from these exchanges. In alignment with the requisites of a cultural studies project, making these connections will allow the critical discursive analysis of these texts to be brought to life in the sense that it can be analyzed within a social context that could provide implications to affect positive change within this particular learning environment (Hyttén, 1997).

The Next Steps

In this chapter I have outlined three central fields of literature that help to provide a comprehensive understanding of group dynamics, communicative studies, and critical social theory work. Acknowledging the breath of the scholarship associated with collaborative learning literature, I presented the rationale for integrating these specific fields for the purpose of this dissertation. I contend that each provides a useful foundation within which to situate the conceptual framework being utilized for this dissertation and therefore the contributions of this dissertation as a cultural studies project. In chapter three, I will present the data for this research and outline the methods that will be utilized to conduct the critical discourse analysis for this dissertation. In presenting the data, I introduce the naturalistic and interpretivist constructionist paradigms that guide what information is necessary to provide credibility and accuracy to this work. As part of this effort, I introduce the context for the original, larger study in which this

archival data was collected and delineate my role in this larger study. In my description of the data, I also provide details pertaining to the actual texts comprising this archival data. As part of the description of the data analysis, I present the mechanics by which Gee's (2004) approach to *cda* was used: via a thematic analysis of archival data tagged with Gee's (2004) *Seven Building Tasks* and these themes' subsequent connection to his *Theoretical Tools of Inquiry*. I conclude chapter three by presenting how trustworthiness was maintained for this dissertation and provide my positionality with regards to this research.

CHAPTER 3

OUTLINING THE METHODS:

A PRESENTATION OF THE CIDI COURSE ARCHIVAL DATA AND THE DATA ANALYSIS METHODS

Introduction

As indicated by the literature presented in chapter two, collaborative learning environments are complex. Such complexity can be analyzed through distinct and diverse lenses, including group dynamic models, communication studies research, and critical social theories that analyze the role of power, language, and identity regarding knowledge construction. The purpose of presenting such distinct research lenses as part of the literature review for this dissertation is to underscore that collaborative learning is a topic that can and should be studied from various angles. I situate my dissertation at the intersection of these scholarly traditions through the use of *critical discourse analysis (cda)* as the conceptual framework for this research that offers an interdisciplinary perspective by which to analyze *language-in-use-in-society* (Gee, 2004, 2008).¹⁰ The argument is that by looking at collaborative learning from an interdisciplinary, critical, postmodern lens I am taking inspiration from these frameworks and delving deeper into one aspect of this learning environment that could have implications for several of these fields. This review of the literature links directly to the research design and

¹⁰ As noted in chapter one, I am utilizing Rogers' (2004) conceptualization of *critical discourse analysis (cda)* versus Critical Discourse Analysis as *cda* is considered to be a more holistic version of the field that encompasses a larger breadth of approaches to critical discourse research. When utilized as critical discourse analysis, it refers to the actual analysis of the data.

objectives outlined in chapter one where I proposed that the aim of this dissertation is to investigate how power manifests in the discursive practices of students enrolled in a collaborative learning course (the Clinical Immersion at Disciplinary Interfaces, i.e., CIDI) at the undergraduate level.

Throughout the discussions of each section of the literature review, I linked the overarching topics back to the frameworks that were introduced in chapter one. In particular, I related the group dynamic models and the communication studies literature to two different ways in which collaboration can be studied to help underscore the complexity of collaboration. This complexity also helped to reiterate the rationale for using an interdisciplinary approach like *cda* as a conceptual framework to explore collaboration within an undergraduate context within a more holistic lens. In chapter one I also presented the contextual framework for this dissertation, introducing the CIDI course as a paradigmatic context within which to explore collaborative interactional discourse at the undergraduate level. The research objective, design, and guiding questions were also presented in chapter one and links to the critical social theory literature presented in chapter two. This will be reviewed in the following to help connect the ideas from chapters one and two to the data analysis methods discussed within this chapter.

Purpose and Organization

To build on what chapters one and two have thus far presented, the purpose of chapter three is twofold: to introduce the archival data that is being utilized for this dissertation and to provide key information regarding the methods utilized for conducting the critical discourse analysis for this dissertation. As the archival data for this work is derived from a larger research project in which I played a large role in the data collection, I intend to delineate relevant information about how this data was initially collected, how it will be utilized in this dissertation,

and how my role in both influence the analysis of the archival data for this dissertation. Situating this work within a naturalist and interpretive constructionist paradigm, I follow the scholarship from these fields to understand what information needs to be presented in order to ensure the credibility and accuracy of this research (Rubin & Rubin, 2012). To accomplish the second objective for this chapter, I link the methods of this work to the conceptual and analytical frameworks presented in chapter one of this dissertation. I do so in an effort to facilitate the connection of the methods utilized for this analysis with the theories that permit such an analysis to be considered a valid, critical investigation.

My efforts to accomplish both of these objectives commences with a review of the research design for this dissertation and an introduction to how such research is representative of the naturalist and interpretive constructionist paradigms. I then enter into presenting the data through various sections representative of research situated within these paradigms including: presenting the original research context, establishing why this context is imperative for this dissertation, presenting the student population represented in this data, the original field entry and data collection process, and how these connect to this dissertation research design. In the following section, the specific methods utilized for the data analysis are outlined. This section is intended to connect the conceptual and analytical frameworks presented in chapter one to the actual mechanics of the analysis of this dissertation. This chapter finalizes with a review of the measures of trustworthiness and the limitations associated with this research design and analysis. As with all of the chapters in this dissertation, I conclude this chapter by offering a roadmap of the upcoming chapter to help connect the ideas presented in this chapter to the overall structure of the work.

Reviewing the Research Design & Research Paradigms

This dissertation's research design, questions, and objectives were first presented in chapter one. As this current chapter emphasizes how use of this archival data and the proposed methods to analyze this data are appropriately aligned with the overall research objectives, I reiterate these statements here to facilitate the connection between these plans and the rationale for utilizing archival data from the CIDI course. The research objective for this dissertation is to examine how power manifests in the discursive practices of students enrolled in a collaborative learning course at the undergraduate level. The following research questions guide this investigation:

- 1) How does power manifest in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?
- 2) What is the role of power concerning new knowledge construction as reflected in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?

In examining these dynamics, I aim to better understand the underlying factors related to power and help identify pedagogical implications that can help to enhance positive power influences or alleviate asymmetrical power dynamics that may influence collaborative learning environments. As noted in chapter one, I intend to use the CIDI course as a contextual framework for this dissertation as this course provides a unique collaborative learning environment in which to

analyze student interactions representing two distinct disciplines – chemical engineering and nursing. Specifically, I use Gee’s (2004, 2008) approach to *cda* on archival data in the form of focus group transcripts and debriefing notes that comprise part of a larger data corpus from the CIDI course.¹¹ I argue that this archival data provides a paradigmatic scenario for investigating the pedagogical implications intertwined in the dynamics of power and discourse as the data was collected within the context of an interdisciplinary learning environment at the undergraduate level. Wherein Gee’s (2004, 2008) approach to performing critical discourse analysis informs the analytical framework for this research, I position this approach within the larger field of *critical discourse analysis* which provides the conceptual framework. I label this work a cultural studies project because its significance lies with uncovering power dynamics and is motivated by praxis, wherein such research will attempt to affect changes in the way collaborative learning is facilitated (Hyttén, 1997).

The Naturalist and Interpretive Constructionist Paradigms

Details concerning this archival data (e.g., population, collection process, IRB approval) and the larger research study from which this archival data is taken will be expanded on in this chapter in an effort to provide transparency and clarity. In presenting this archival data as

¹¹ This language is adopted from Braun and Clarke’s (2006) description of data corpus and dataset. According to the authors, “Data corpus refers to all data collected for a particular research project, while data set refers to all the data from the corpus that is being used for a particular analysis” (Braun & Clarke, 2006, pp. 5-6). In accordance, the data corpus regards to all of the data collected for the original, larger study, wherein the dataset refers to the data items that comprise the archival data utilized for this dissertation.

appropriate for a critical discourse analysis, it is important to understand how such a conceptual framework is situated within a postmodern contextual framework. This connection, in turn, leads to a necessary discussion of three research perspectives: positivist, naturalist, and interpretive constructionist. The positivist perspective presupposes that knowledge is neutral (i.e., not influenced by social, historical, or cultural contexts) and can therefore be observed through objective measures (i.e., quantitative calculations); the purpose of such research is to discover universal truths (Rubin & Rubin, 2012). In turn, the naturalist paradigm highlights the importance of context, complexity, and the multifarious nature by which humans interact within various contextual markers; an associated perspective - the interpretive constructionist paradigm - emphasizes the importance of understanding how people interpret their context to establish values and meanings (Rubin & Rubin, 2012). Both of these paradigms acknowledge that multiple perspectives exist and emphasize that the purpose of such research is to understand, emancipate, or deconstruct a multitude of social realities (Lather & St, Pierre, 2013; Rubin & Rubin, 2012).

Two variants of the naturalist and interpretive constructionist paradigms are the postmodern and critical perspectives. As noted in the contextual framework delineated in chapter one, the postmodern perspective argues that neutrality is impossible within any given context (Barker, 2012; Rubin & Rubin, 2012). For postmodernists, there exists no *one totalizing knowledge* that is capable of explaining and encompassing an objective conceptualization of the world as human existence is complex, heterogeneous, and thus necessitates multiple viewpoints by which to interpret knowledge as socially and historically situated (Barker, 2012, p. 21). The critical perspective maintains the purpose of research is emancipation – that is, based on the discovery and remediation of socially rooted imbalances derived from power asymmetries

(Barker, 2012; Lather & St. Pierre, 2013; Rubin & Rubin, 2012). As the conceptual and analytical frameworks for this dissertation are inspired by postmodern, critical interpretations concerning language, it is imperative to discuss these assumptions in order to position the archival data and methods within their appropriate frames.

In accordance, the following sections are aligned with those typically representative of research situated within the naturalist and interpretive constructionist paradigm (Rubin & Rubin, 2012). As such a research lens aims for knowledge to be constructed from multiple perspectives within the data rather than arrive at one point that is considered objective knowledge, contextual markers, thick descriptions, and connections of significance made from the researcher's perspective are important in order to maintain the credibility of such work (Rubin & Rubin, 2012). Moreover, I propose that as the analytical framework (i.e., Gee's [2004, 2008] approach to *cda*) for this dissertation integrates aspects of narrative inquiry, critical theory, and socio-cultural approaches to research, delineating aspects associated with the larger paradigm in which these are situated is appropriate (Rogers, 2004; Rubin & Rubin, 2012). Aligned with these guidelines, I couple this chapter with chapter four which will go into more detail concerning the contextual elements representative of the CIDI course and therefore the context in which this data was produced.¹²

¹² I have conceptualized chapters three and four as complementary to one another in that wherein the former is intended to present the mechanics of the data collection process and details relevant to understanding the archival data that is used for this dissertation, chapter four is specifically dedicated to presenting the details associated with the CIDI course that make it a relevant context in which to investigate the research objective for this dissertation. This dedication of chapter

Introducing the Origins of the Archival Data

The archival data for this dissertation is taken from a larger study conducted over the course of several semesters at another university. In an effort to provide all of the relevant details necessary to understand the origin of this archival data and its significance for answering the abovementioned research questions, I delineate several aspects that contributed to my interest in this data. These elements include: an introduction into the larger research context (i.e., why this data was initially collected), an outline of the characteristics of this university that make this course and its data unique, the population represented in this data, the field entry process associated with this data collection, and this dissertation research design process and IRB approval for this work.¹³ I describe these elements in detail with the intention of providing contextual elements of the origins of the archival data for this study that are relevant to understanding its significance to this dissertation and the importance of my engagement in the original data collection process. In doing this, I am outlining the components of the larger database that were collected over four semesters for the larger research study while purposefully denoting the specific components of this database that will be utilized for this dissertation for the purpose of conducting original research. I believe this information to be important for this

four to delineating the social, historical, and cultural markers associated with the CIDI course, as well as its logistics, purpose, and motivation, are aligned with Gee's (2004, 2008) analytical framework which presupposes that presenting a thick context is necessary to understand the social dynamics being studied in the discourse.

¹³ Again, these sections are representative of those associated with work situated in the naturalistic and interpretive constructionist paradigms (Rubin & Rubin, 2012).

dissertation as it provides an overview of the larger research picture in which this dissertation fits as well as indicating how the work conducted here is both new and relevant for the extant scholarship in this area.

Research Context – Overview of the Origins of the Archival Data

Purpose of the Larger Study. The archival data being used for this analysis stems from a larger study entitled, *An Exploration of Communication, Idea Generation, and Prototype Development at Disciplinary Interfaces*, conducted at a public, Southeastern, four-year university.¹⁴ The purpose of this larger study was to evaluate the influence of nursing and chemical engineering student engagement in an undergraduate, interdisciplinary collaborative learning course called the Clinical Immersion at Disciplinary Interfaces (CIDI) on three variables: critical thinking, interdisciplinary communication, and prototype design. This study commenced in the Fall 2015 semester and was completed in the Spring 2017 semester, totaling four semesters. The CIDI course's initial purpose was to develop an environment in which students from the nursing and chemical engineering disciplines could work together in a creative environment on a prototype design geared towards addressing a student-identified healthcare issue (Arce et al., 2015; Sanders & Geist, 2016). The course's objectives included: encouraging students from both disciplines to learn about the other to expand their understanding of healthcare issues; expose students to experiential learning scenarios by holding clinical immersion sessions in a variety of healthcare settings; build collaborative learning skills (i.e., teamwork, leadership, communication) by working in small interdisciplinary groups throughout

¹⁴ As noted in chapter one, the identity of this institution will remain confidential in order to protect the confidentiality of the students enrolled in the CIDI course.

the semester; enhance student creative thinking skills by engaging in a collaborative design activity resulting in an innovative prototype of technology (Arce et al., 2015; Sanders & Geist, 2016).

Although there exist several examples of interdisciplinary undergraduate courses that engage in various collaborative learning activities, the CIDI course is unique in that it has received recognition for its best practices and innovative strategies from both the industries in which its students are entering and educational institutions. For example, the CIDI course received initial funding from a Quality Enhancement Plan grant and was recognized by two external, educational funding foundations for its efforts and best practices related to enhancing student creative thinking and collaborative learning skills (Sanders & Geist, 2016). Most recently, the professors who designed this course also received their university's highest pedagogical recognition in advancing best practices in innovative-learning strategies when they received the Innovation and Creativity award in instruction and practice. Based on these endorsements, there is an incentive to further explore student interactions to better understand how working within this environment is influencing the creation of new knowledge.

The Design of the Larger Study. The design of this larger study encompassed both a quantitative and qualitative research component. Institutional Review Board (IRB) approval was granted from the host institution for this larger study prior to collecting data and student consent forms were collected for every semester data was collected. Quantitative data was collected each semester for the entirety of the study and was comprised of a pre- and post- test design in which students completed the Critical Thinking Assessment Test at the start and end of the semester to evaluate skills related to creativity, critical thinking, and problem solving (Stein, Haynes, Redding, Harris, Tylka, & Lisic, 2009). This data was collected with the intention of

understanding one of the components of the larger study: critical thinking. The qualitative element of this study incorporates a myriad of data collection efforts including: eight focus group interviews (two per group, one at the initial design stage, the other during designing); student team observations; student debriefing notes; and coursework activities (including student class and design notes).

Qualitative data was collected during only one of the semesters for the purpose of understanding the other two components of the larger study: interdisciplinary communication and prototype design. The fourteen students (comprising four interdisciplinary teams) enrolled in one semester were purposefully selected to participate in the qualitative component of the study as they represented the diverse student population characteristic of both disciplines.¹⁵ The purpose of the qualitative component was to explore what type of communication skills students were utilizing to navigate an interdisciplinary setting, identify what resources and pedagogical components of the course were assisting students in their prototype design, and understand challenges that students faced in both the clinical immersion and design phases of the course in order to improve those for future semesters. The focus group protocols were semi-structured and designed to be aligned with these research interests; specifically, they asked student groups about three general categories related to communication and group dynamics, overall reactions and insight about the course, and their collaborative efforts and progress regarding the prototype design. Trained researchers (the two principal investigators and myself as an outside consultant) representing two four-year universities conducted all of the focus group interviews.

¹⁵ In order to protect student anonymity, the specific semester in which the qualitative data was collected will not be listed in this dissertation.

Site Selection – Understanding the Relevance of the Contextual Framework

A key feature of the CIDI course is the purposeful interdisciplinary and collaborative learning environment that students must engage in throughout the duration of the semester to complete an innovative prototype of technology (Arce et al., 2015; Sanders & Geist, 2016). This provides a unique setting in which to take a critical lens to student discourse that is a product of an interdisciplinary context. According to Gee (2008) such data is representative of *interactional* discursive exchanges that allow for a better alignment of the analysis to the context in which the data was collected. Due to the complexity of collaborative learning environments as inherent social spaces of idea exchange, the work presented in this dissertation is invaluable to not only this larger study but cultural studies scholarship in general through its use of a critical, postmodern lens to analyze student level discourse to understand the power dynamics influence how students interact and construct knowledge with one another.

Regarding the larger, institutional context, the setting of the CIDI course in the host institution – a public, Southeastern, four-year university – also provides a myriad of interesting characteristics that are relevant for this dissertation. First, the university's College of Engineering (COE) has adopted several elements of the pedagogical model created by the Renaissance Foundry Research Team, which is known for its dedication to advancing collaborative learning and constructivist environments. Second, the institution is well known for its university-wide efforts concerning the advancement of creative and critical thinking skills at the undergraduate level. In addition, it has a strong foundation and reputation for its academic excellence in the technological disciplines, including the two disciplines enrolled in the CIDI course. Finally, due to the recruitment and retention efforts of both of these disciplines over the

past few years, this institution has been able to increase the percentage of underrepresented student populations in both of these fields.

For the purpose of this dissertation, the adoption of several elements of the pedagogical model created by the Renaissance Foundry Research Team is significant. Part of the research efforts from this group resulted in the Renaissance Foundry pedagogical model (hereafter the Foundry Model) which has won both regional and national recognition (Arce et al., 2015). Meant to be a learning platform to help students engage in higher-level thinking processes through collaboration, the Foundry Model consists of two pedagogical paradigms aimed at resolving a student-led challenge: Knowledge Acquisition (KA) and Knowledge Transfer (KT) (Arce et al., 2015). Knowledge Acquisition focuses on securing the students' content background regarding concrete information (i.e., theories, equations, models, etc.); Knowledge Transfer focuses on applying the content background developed as part of the KA to a Linear Engineering Sequence (LES) that works towards the development of a prototype of innovative technology through group work and collaboration (Arce et al., 2015). Envisioned to be an iterative process, students are encouraged to move back and forth between these pillars as many times as is necessary to develop a prototype of innovative technology regarding their identified challenge (Arce et al., 2015). The research efforts resulting from this group has influenced several curricula designs including that of CIDI course (Sanders & Geist, 2016). For this dissertation, the Foundry Model is relevant as it inspired the pedagogical framework of the CIDI course and therefore the interactions of the students that produced the discourse found within the archival data.

The university's efforts to expand undergraduate creative and critical thinking efforts are also significant as they have led directly to the creation of unique courses like the CIDI course.

These efforts include financial support for a Makerspace (a dedicated learning space with advanced technology to engage students in modeling and prototyping), access to 3D printers, an active campaign to encourage students to be entrepreneurs in their areas, and efforts to support interdisciplinary work at various levels (Halverson & Sheridan, 2014; Martin, 2015). This university also houses a nationally recognized center for advancing critical thinking and assessment and one of few unique collaborative learning classrooms designed and sponsored by the Steelcase Foundation. In an effort to enrich their learning through the accessibility of valuable resources, all of these elements have impacted the diverse opportunities afforded to the students enrolled in the CIDI course in the semester in which this data was collected. Moreover, part of the purpose of the larger study in which this data was collected was to understand how students were using these resources for their continued progress towards a prototype design.

Another characteristic that is of interest for this dissertation and related to the site selection is the actual emphasis on technical disciplines at this university. As the two disciplines that are being studied in this archival data are considered technical disciplines, they follow the strict and rigorous national accreditation standards associated with each field (Accreditation Board of Engineering and Technology [ABET], 2012; Commission on Collegiate Nursing Education Accreditation [CCNEA], 2016). Aligned with these standards, each discipline recruits and enrolls top ranking students that maintain a high Grade Point Average (GPA) and a consistent high work ethic in order to maintain enrollment and reach the upper level divisions of these disciplines. In addition, both disciplines have established their commitment to advancing the creative and critical thinking skills of their students through engagement in campus-wide initiatives that align with larger, national calls within each field (National Academy of Engineering [NAE], 2010; National Academy of Science [NAS], 2014; Sanders & Geist, 2016).

As part of this mission, both the School of Nursing and the College of Engineering have adopted collaborative learning and creative thinking platforms, like the Foundry Model, to advance educational research in these areas (Arce et al., 2015; Sanders, & Geist, 2016).

Finally, due to strong recruitment and retention efforts on the part of both disciplines at this university, the student population for both has become more diversified. This is an interesting point for this dissertation as the population represented in this archival data is reflective of the increased diversity found within both disciplines. In actuality, its geographical location attracts a high number of rural students; however, in the past few years, efforts have increased a steady enrollment from student populations representative of the immediate, larger region. However, the university has also invested in campaigns to recruit traditionally underrepresented student populations within these technical professions. As evidence of these efforts, this university boasts a substantial percentage of non-traditional students and international students as well as increased male student enrollment in the Nursing Program and increased female student enrollment in the Chemical Engineering Program. This is relevant for this dissertation as the data was collected during a semester that was more representative of this diversity, it will allow for a more nuanced lens by which to investigate power dynamics in this setting.

Field Entry & Data Collection –How the Archival Data was Originally Collected

Overview of the Larger Data Corpus. As the archival data for this dissertation is part of a larger study conducted at another university by a collaborative team of researchers representing two university institutions (including the host institution), several of the research components relevant to this larger study were completed in semesters prior to the qualitative data collection process. Prior to collecting any data, a proposal for the study entitled *An Exploration of*

Communication, Idea Generation, and Prototype Development at Disciplinary Interfaces was submitted to the Institutional Review Board (IRB) at the host institution and approved. Upon approval, the principal investigators for this study (i.e., the faculty of the CIDI course) met with the creators of the Critical Assessment Test (CAT) to incorporate pre- and post- testing for students enrolled in the first semester of the data collection for this study. One semester prior to the qualitative data collection, I was recruited by the principal investigators as an outside consultant for helping to design the qualitative data collection process for this larger project. Following the expansive qualitative research approaches highlighted by Corbin and Strauss (2008), multiple forms of data collection methods were designed for this course including focus group interviews, debriefing notes, observations, reflections, and student surveys. A research journal to evaluate positionality issues and the evolving research processes was also kept throughout the semester to help reflect and expand on the larger, overall research initiatives (Clandinin & Connelly, 2000; Rubin & Rubin, 2012).

During this semester, the initial focus group protocols, debriefing note worksheets, reflection prompts, potential student surveys, and IRB appendices and extensions were created and submitted for use in the semester. Once these extensions were granted IRB approval, the qualitative data collection plan was set in place to begin the following semester. My responsibilities regarding this process included the following: helping the principal investigators organize and conduct the focus group interviews, collect the debriefing notes and classroom activities, conduct field notes and observations, and organize all of the data into a comprehensible electronic data corpus for this study. Consent forms for all students were collected prior to collecting any quantitative or qualitative data for any semester (see Appendix

A). In compliance with the IRB regulations, students were reminded that participation was voluntary and could opt out of participating in any of the activities at any time.

Table 1 provides an overview of the data items that comprise the larger data corpus collected for the original, larger study. In total, this data corpus includes six distinct data items collected from different semesters and iterations of the course. From this data corpus, only two of the data items listed in Table 1 (see Appendix B) comprise the dataset of archival data utilized for this dissertation: the focus group transcripts (e) and the debriefing notes (f). Both of these items were taken from the same semester and focus on the same population of students. The originality of this dissertation not only comes from an in-depth analysis of these two items as archival data, but also from applying a critical discourse analysis to the content of these items. As the context within which both of these items was collected is important for the critical discourse analysis conducted in this dissertation, the data collection process for the focus groups interviews and debriefing sessions will be outlined below (Gee, 2004, 2011).

The Focus Group Interviews. With regards to the focus group interviews, the data collection design allowed for two focus groups to be conducted on each team, one after a clinical immersion experience and one after a design team meeting. Student teams were randomly assigned to participate in a focus group interview after each class meeting. Not all student team members were required to be present in order to conduct the focus group interview. At least one principal investigator and I were assigned to conduct the focus groups. The location of each session was dependent on where the team would be located as per the course meetings; for instance, for a clinical immersion focus group the interview could be in the hospital or the device clinic, wherein for the design meetings it could be in the library, Makerspace, or where the team was meeting that day. Prior to beginning the focus group interview protocol a brief introduction

about the larger project's research purpose and its connection to the larger study's research questions were established. Each student was assured that their information would remain confidential and secure through a detailed description of how confidentiality would be maintained. The clinical immersion protocols were shorter (ten questions) as debriefing sessions were also organized in tandem and were to take place prior to the interview; on average, these lasted twenty minutes (see Appendix C). The protocol for the design meeting focus group interviews was purposefully longer (eighteen questions) as more time was allotted for these sessions; on average, these interviews lasted thirty-five minutes (see Appendix D). The consent forms also allowed for students to be audio recorded and these recordings transcribed: all students agreed to be recorded. In the following semester, I completed the transcribing for all focus group interviews and uploaded the transcripts to a secure database for concurrent and future research purposes.¹⁶

The Debriefing Notes. Although debriefing notes were collected for four semesters of the course, for the purpose of this dissertation I am only interested in the notes collected for the semester in which the focus group interviews were collected to remain consistent with the student population of focus. For the student debriefing notes, worksheets were provided to all students after two of the clinical immersion experiences (see Appendix E). These worksheets asked a variety of questions related to initial reactions, questions, or comments about their

¹⁶ My qualifications for conducting the interviewing and transcribing of the audio recordings for this larger research project include five years of extensive training with semi-structured and structured interviewing and transcribing on various populations in my work as a policy analyst and educational researcher.

general experience in the different settings and their experiences within their team. Both of the principal investigators for this larger study were responsible for distributing and collecting these notes in two of the debriefing sessions, each which took place after each of the clinical immersion sessions (and prior to the focus group interviews). These sessions were conducted in a mutual location where all students could participate. The discussions in these sessions were meant to be reflective and intended to help students unpack the intensive clinical immersion experiences and connect what they experienced to course objectives; discussions during these sessions were led by the two lead principal investigators. During these sessions, I was responsible for taking field notes and uploading the collected debriefing notes to a secure database on the same day.

The Archival Data for this Dissertation

In designing the research proposal for this dissertation, it was clear that I was interested in studying collaborative learning environments. Throughout my doctoral program, I was engaged in teaching an undergraduate course that utilized collaborative learning methods and was concurrently conducting philosophical, sociological, and theoretical (e.g., critical, social, feminist) research on this topic. When I was recruited to become a consultant for this larger research project, I became fascinated by the intentional pedagogical design of the CIDI course - which is arguably unique in its combination of these two disciplines - and its purposeful utilization of collaborative learning techniques (Arce et al., 2015; Sanders & Geist, 2016). As I became invested in this project, I understood that this course could provide a paradigmatic contextual framework by which to understand student interactions in the knowledge construction process.

However, as this dataset pertains to a larger study, it must be understood within the description of archival (i.e., previously collected prior to the beginning of this dissertation) data as the questions utilized in the initial research design for the larger project were geared towards that research objective and not this dissertation's research objective (Babbie, 2008). Regardless, much like transcripts from media sources, existing texts, or other types of archival data, the interactions captured by this data as existing discourse arguably still allows for a critical analysis to be executed (Gee, 2004; Rogers, 2004). To understand this, a brief background of the type of data needed to conduct a critical discourse analysis is warranted. In this section, I provide the rationale for the use of this archival data, the ethical review processes that were completed in both interested institutions to receive permission to use this archival data, followed by a description of the population represented in this archival data and a description of its actual components (i.e., the focus group transcripts and the debriefing notes).

The Rationale for the use of Archival Data

According to Rogers (2004) the data necessary to perform a critical discourse analysis is simply discourse as represented in a textual form (e.g., transcripts, books, websites, articles, publications, newspapers). In many cases, the discourse under analysis is historical or archival and represents verbal or written communication as expressed in a certain instance, within a specific context. This flexibility permits that the data utilized for critical discourse analysis does not need to be fresh (e.g., captured within a specific moment or context) nor necessarily aligned with the research question proposed (e.g., using presidential speeches to understand the power dynamics associated with education policy initiatives). However, having archival data that is aligned with the contextual framework of interest provides certain advantages. Specifically, for this dissertation, the use of the focus group transcripts and debriefing notes as archival has three

advantages from traditional text-based data sources: 1) it was collected within the environment of interest (i.e., collaborative learning); 2) I was involved in the data collection process which allows for a richer understanding of the data; and 3) it represents what Gee (2004) refers to as interactional data in which participants are actively communicating with one another to understand their experiences and observations. For Gee (200, 2008) this interaction allows for the discourse being analyzed to have more depth than perhaps text-based discourse that was collected from an individual speech for a larger audience (i.e., no interaction, singular view, with no rebuttal).

The argument for use of this archival data for this dissertation is thus heavily anchored in the actuality of how, when, and where this data was originally collected. In particular, this data was collected from students reflecting on their experiences and observations within a collaborative learning environment. As this dissertation aims to explore such dynamics, data reflecting such experiences are valuable to providing more insight regarding the central phenomenon being studied (Brissett & Mitter, 2017; Rogers, 2004). Second, as I was involved in the data collection process, I am familiar with the data and how it was collected. This allows for a deeper understanding of the idiosyncrasies embedded within this data to provide a more accurate analysis for this work (Braun & Clarke, 2006; Riessman, 2008). Finally, this data represents interactional student discourse that is reflective of the social and contextual processes inherent within a collaborative learning environment rather than other types of traditional, discursive data (Gee, 2004, 2008). The focus group transcripts are representative of this characteristic as they are the product of discussions and interviews that involve interaction between the students and the discussant/interviewer in order to solicit responses. In this sense, students are providing experiences and observations in the form of reflections and responses to

these discussions. Analyzing such discourse (i.e., texts) with a critical lens is aligned with my ultimate aim in this dissertation: to explore how power manifests in the discursive practices of students enrolled in a collaborative learning course at the undergraduate level (Gee, 2004; Mills, 1997).

Institutional Review Board (IRB) Approvals for this Dissertation

Prior to conducting the research for this dissertation, several steps were taken to ensure that the proposed critical discourse analysis would be in line with the original permissions of use of this data. First, I consulted with the two principal investigators that own the original database and was granted permission to use the focus group transcripts and debriefing notes as archival data for this dissertation. Second, I obtained IRB approval from the host institution for use of the focus group transcripts and debriefing notes as archival data for this dissertation. This approval ensured that no permissions provided by students' consent in the original study were being violated by the research proposed in this dissertation. Finally, the University of Tennessee approved the use of the focus group transcripts and debriefing notes as archival data for the purpose of this dissertation. Both approvals ensured that the proposed research for this dissertation maintained student confidentiality and was indeed considered original work for the purpose of this dissertation. All approvals were obtained prior to conducting any analysis for this dissertation.

Population – The Participants Reflected in this Archival Data

The population for this archival data was a purposeful sample consisting of the students that were enrolled in one semester of the CIDI course. This semester was intentionally chosen as it represented the diversity observed in both of the disciplines (i.e., nursing and chemical engineering) represented in this course. This population was comprised of fourteen upper level

(i.e., junior and senior) undergraduate students who voluntarily enrolled in the CIDI course during this semester. Students who enrolled in this course understood that it was geared towards topics that intersected both disciplines and converged on the field of healthcare. For nursing students, this course offered a chance to engage in another type of mandatory clinical immersion experience that counted towards program completion; for chemical engineering students, this course is offered as part of a biomedical specialization within the chemical engineering program. In all recruitment materials, both disciplines advertised that this was a collaborative learning course that focused on designing an innovative prototype of technology within the field of healthcare (Arce et al., 2015; Sanders & Geist, 2016).

The students who enrolled in the semester of the course that collected the qualitative data for the larger study were evenly divided between the two representative disciplines (i.e., seven per major), with a gender composition of three female and four male engineers and five female and two male nursing students. The gender balance is important to note as it is representative of the recruitment and retention efforts of this university to increase the number of underrepresented student populations in their respective disciplines. It was also the case that these students represented other noted underrepresented student populations within both disciplines, including non-traditional and international students. All of these descriptors are detailed in Table 2 (see Appendix F).

At the beginning of the semester, these students were placed in small, interdisciplinary teams of three or four students. Each team was selected by the instructors of the course in accordance with team formation guidelines posited by collaborative learning experts at the undergraduate level (Barkley, Major, & Cross, 2005; Felder & Brent, 2015; Sanders & Geist,

2016). Care was taken to ensure that each discipline was represented in the teams and that each team was heterogeneous with regards to gender. Table 3 delineates the composition of each team (see Appendix G).

Description of this Archival Data: Focus Group Transcripts and Debriefing Notes

With regards to the actual archival data (i.e., the focus group transcripts and the debriefing notes) the details are as follows. As noted, the focus group transcripts represent interviews conducted after the clinical immersion and team design experiences. There are two focus group transcripts for each student-team: one representing the clinical immersion and the other the design experiences. These transcripts total eight full-length interview documents. Table 4 (see Appendix H) presents more details pertaining to this archival data. In the semester that students participated in focus group interviews, students were asked to participate in debriefing sessions after each clinical immersion experience. As noted in the data collection process, although there were four sessions in total, only two of these debriefing sessions had accompanying worksheets that became debriefing notes for the database. These two sessions produced two sets of student debriefing notes, totaling twenty-six student worksheets that comprise part of the archival data for this dissertation. These notes are hand-written and represent student reflections to the worksheet questions either in full sentence or shorthand form responses (see Appendix E).

Data Analysis Methods

The data analysis methods for this dissertation consist of two distinct stages that align with Gee's (2004, 2008) overall approach to *critical discourse analysis*. Within the first stage, I utilize Gee's (2004, 2008) Seven Building Tasks to decipher the CIDI course archival data and tag the data to indicate instances of these Building Tasks. The steps of Braun and Clarke's

(2006) thematic analysis process are followed to identify themes within the CIDI course archival data tagged with Gee's (2004, 2008) Seven Building Tasks. These themes are then analyzed and understood with regards to the Building Tasks they encompass (Gee, 2004, 2008). In the second stage, I analyze the themes derived from the first stage by applying Gee's (2004, 2008) Theoretical Tools of Inquiry to situate the discourse within the analytical, critical framework provided by his Theory of Language. This framework – inspired by a postmodern interpretation of language - allows for discourse to be analyzed from a critical perspective on two different levels which offers the possibility of understanding language to be representative of the social, political, cultural, and historical elements that direct its value and meaning (Gee, 2004, 2011; Rogers, 2004). Further, as no critical discourse analysis has hitherto been conducted on this archival data, it therefore establishes this dissertation as original, cultural studies research within this area of scholarship. The following explains the two stages of the critical discourse analysis conducted for this dissertation in more detail.

Outlining the First Stage of the Critical Discourse Analysis

The purpose of this stage of the cda is threefold: to decipher the CIDI course archival data with regards to Gee's (2004, 2008) Seven Building Tasks; conduct a thematic analysis on this tagged, archival data; and then analyze these themes with regards to the Building Tasks they encompass. I purposefully integrate a critical lens with a thematic analysis to uncover power dynamics that make these themes relevant and recognizable in the world of social exchange (Gee, 2004; Rogers, 2004). As Gee's (2004, 2008) Theory of Language is more focused on the socio-cultural aspects influencing language meaning and value, it runs counter to the more traditional structural linguistic analysis that follows a psycholinguistic approach to *critical discourse analysis*. As I was not intending to use a purely psycholinguistic approach to *cda*, I anchored Gee's (2004, 2008) approach to *cda* to a thematic analysis to provide an initial

understanding of the data that could then be interpreted through a more holistic lens. This is aligned with a socio-cultural approach to discourse analysis which fits within the description of a cultural studies project described in chapter one (Brissett & Mitter, 2017; Hytten, 1997; Lim, 2014; Wright, 1996).

This coupling of Gee's (2004, 2008) Theory of Language with a thematic analysis is inspired by Rogers' (2004), suggestion that *cda* work is meant to be hybridized with other, complementary methods. Specifically, she suggests that most socio-cultural approaches to *cda* (e.g., Gee's approach) need to be combined with specific steps with which to engage with discourse in order to apply critical theory to textual analysis (Rogers, 2004). As *cda* is meant to provide a descriptive analysis of discursive data, it needs to be paired with a mechanism by which to easily interpret, or digest, large amounts of text (Rogers, 2004). In following with this suggestion, I combine Gee's (2004, 2008) approach to *cda* with Braun and Clarke's (2006) six-phase guide to thematic analysis. These six phases include the following: familiarization with the data, coding the data, defining themes, reviewing and refining themes, evaluating themes, and reporting themes.

I chose Braun and Clarke's (2006) six-phase model, in particular, because the authors celebrate the flexibility of thematic analysis as a method, intentionally encouraging scholars to combine this model with various types of theories, interpretations, and applications. For them,

In contrast to IPA or grounded theory (and other methods like narrative, discourse or CA), thematic analysis is not wed to any pre-existing theoretical framework, and so it can be used within different theoretical frameworks (although not all), and can be used to do different things within them. Thematic analysis can be an essentialist or realist method,

which reports experiences, meanings and the reality of participants, or it can be a constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society. (Braun & Clarke, 2006, p. 9)

The purpose of thematic analysis is to provide an interpretation of the data that reflects the central patterns connected to the major objective outlined by the study's research questions (Braun & Clarke, 2006). As the researcher is responsible for not only defining the research questions, reading the data, and identifying the themes derived from the phases of this model, much of the judgment and decision-making aspects within thematic analysis lies with the researcher throughout the process (Braun & Clarke, 2006). Further, when researchers combine this six-phase model with a specific, guiding theory, Braun and Clarke (2006) posit that the study's purpose shifts to a more latent thematic analysis. For the authors, this process still involves the identification of themes via an inductive approach, but the analysis itself is heavily influenced by an established, pre-existing theory (Braun & Clarke, 2006).¹⁷

¹⁷ Braun and Clarke (2006) describe an inductive approach as follows:

An inductive approach means the themes identified are strongly linked to the data themselves (Patton, 1990) (as such, this form of thematic analysis bears some similarity to grounded theory). In this approach, if the data have been collected specifically for the research (e.g., via interview or focus group) the themes identified may bear little relationship to the specific questions that were asked of the participants. They would also not be driven by the researcher's theoretical interest in the area or topic. Inductive

As several of the assumptions associated with Braun and Clarke's (2006) six-phase model for thematic analysis pair well with the purposes and foundations related to *critical discourse analysis*, this specific model was chosen for the cda conducted for this dissertation. In the following, the three major steps outlining the aforementioned purpose of this stage of the cda are detailed. For clarity, these steps are paired with their respective phases from the Braun and Clarke (2006) six-phase model.

Step One: Familiarization and Coding. As noted, the purpose of this step in stage one of the cda is to decipher the CIDI course archival data with regards to Gee's (2004, 2008) Seven Building Tasks and code the resulting data. These two items are anchored in Braun and Clarke's (2006) description of the familiarization and coding phases of their model. Familiarization is defined as a deep immersion within the dataset, wherein the researcher repeatedly reads the data to understand nuances, contextual meanings, or instances of noted patterns (Braun & Clarke, 2006). Familiarization was established in my engagement with the data collection process as a research consultant. For this work I was present from the initial stage of data collection for both the focus group interviews and the debriefing notes; I was also invested in completing the transcribing and organizing of the focus group interview audio data once collected. This access allowed me to enter this phase of the thematic analysis model with a strong level of understanding with regards to the context in which the archival data was collected as well as the archival data itself (Braun & Clarke, 2006). Further, I reviewed the data holistically at least two

analysis is therefore a process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions. In this sense, this form of thematic analysis is data driven. (p. 12)

more times and reviewed the transcripts and debriefing notes alongside my field notes and journal entries to gather a better understanding of the idiosyncrasies within the archival data (Braun & Clarke, 2006; Clandinin & Connelly, 2000; Rubin & Rubin, 2012).

As part of this familiarization phase, I was also noting my initial understanding of potential Building Tasks that were embedded in the language used by students within the data (Braun & Clarke, 2006; Gee, 2004, 2008). These initial notes helped me to then tag the archival data to denote instances of Building Tasks (Gee, 2004, 2008). I consider this step part of the familiarization phase because I was still reading and understanding the data in this process; however, in tagging the data with the Building Tasks, I was reading the data from an understanding of Gee's (2004, 2008) Building Tasks. This tagging of the data was conducted in NVivo and recorded as a specific set of nodes in this software system (QSR International, 2017). However, this tagging was not part of the coding of the archival data.

For Braun and Clarke (2006) the coding phase of their thematic analysis model is comprised of reading the data purposefully with the intention of noting interesting aspects of the text as they relate to the research questions central to the study. They define codes as follows:

Codes identify a feature of the data (semantic content or latent) that appears interesting to the analyst, and refer to 'the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon' (Boyatzis, 1998: 63). (Braun & Clarke, 2006, p. 18)

The initial coding was entwined with the familiarization step in that patterns within the tagged, archival data were already becoming evident in the prior phase of this model (Braun & Clarke,

2006). As I focused on fully comprehending student responses by rereading their transcripts and debriefing notes in their entirety, I engaged in an inductive approach to coding, wherein categories utilized for analysis emerged from the data rather than preceding the analysis (Braun & Clarke, 2006; Lincoln, Lynham, & Guba, 2011; Strauss & Corbin, 1998).

These codes were specific to the reading of the tagged archival data and reflect a wide array of patterns which I deemed of interest as they related to various facets of the CIDI course. Some examples include: student communication (with each other, nurses, patients, professionals), student interaction (with each other, other individuals, different space, equipment), student interpretations (forms of thinking, sense of self, what they deemed important), *inter alia*. These codes were recorded as a separate set of nodes within the NVivo software system (QSR International, 2017). Three archival data excerpts, illustrating the tagged process and their related codes, is provided in Table 5 (see Appendix I).

Step Two: Defining, Reviewing, Refining, and Evaluating. The next step in stage one of the cda for this dissertation is associated with Braun and Clarke's (2006) defining, reviewing, refining, and evaluating phases. The purpose of this step in this stage of the cda is to conduct a thematic analysis on this tagged data – that is, derive overarching patterns from the codes that emerged from the previous phase with the purpose of creating creditable themes. For Braun and Clarke (2006), these phases are categorized by the following:

Phase 3 begins when all data have been initially coded & collated, and you have a long list of the different codes you have identified across your data set. This phase, which re-focuses the analysis at the broader level of themes, rather than codes, involves sorting the different codes into potential themes, and collating all the relevant coded data extracts

within the identified themes. Essentially, you are starting to analyse your codes, and consider how different codes may combine to form an overarching theme. (p. 19)

This description is aligned with the defining stage, wherein the resulting themes are considered candidate themes (Braun & Clarke, 2006). The reviewing and refining stage is comprised of an interpretive analysis of these candidate themes where their relation to the research questions driving the study is examined. In this phase, themes are categorically judged in terms of the existence of data available to support them, their congruity to the overarching idea, and their relevance to the purpose of the overarching study (Braun & Clarke, 2006). These resulting themes are considered the basis for the thematic map which will guide the next phase of the model (Braun & Clarke, 2006). The evaluation phase commences once another iterative round of defining, reviewing, and refining is completed (Braun & Clarke, 2006). In this phase, the “essence” of the remaining themes is analyzed with regards to the purpose of the study (Braun & Clarke, 2006, p. 22). In this phase, sub-themes, meanings, and nuances within the resulting themes are evaluated (Braun & Clarke, 2006).

Concerning these phases in relation to this step of stage one of the cda for this dissertation, I engaged in defining themes initially by reading and rereading the set of nodes representing the codes from the coding phase (Braun & Clarke, 2006). Several of these codes overlapped with one another and were related to similar aspects of the CIDI course. For example, the codes Anxiety, Nervousness, Uneasy, Fearful, were all associated with how students felt in anticipation of engaging with different settings of the CIDI course. I combined these codes together to form the initial candidate theme of “Discomfort” during this phase in the analysis. This type of defining continued as part of a holistic reading of the codes initially

derived from reading the tagged, archival data. As part of the next phase of the model (i.e., reviewing and refining), a comparative analysis was consciously done (Corbin & Strauss, 2008). This entailed thinking about each item in relation to one another and within the context of the CIDI course, noting if any commonalities emerged between the candidate themes identified in the previous phase (Braun & Clarke, 2006; Corbin & Strauss, 2008).

This phase resulted in a more refined list of themes comprising a thematic map which provided the foundation for the following phase (Braun & Clarke, 2006). As deeper connections began to emerge in the second round of reviewing and refining, I engaged in more evaluating techniques leading to the division of the themes in the thematic map into overarching patterns that better categorized specific, associated themes. As part of the evaluation phase, I analyzed these resulting themes and created sub-themes in relation to the research questions for this dissertation; this process ensured congruity between the examples encompassed in each theme to reflect the “essence” of these overarching ideas (Braun & Clarke, 2006, p. 22). For all of these thematic analysis processes, separate sets of nodes were produced in the NVivo software system (QSR International, 2017).

Step Three: Reporting. The third step for stage one of the cda conducted for this dissertation is comprised of the reporting phase in Braun and Clarke’s (2006) model. The purpose of this step is to reintegrate Gee’s (2004, 2008) Building Tasks into the analysis of the themes resulting from the prior phases. According to Braun and Clarke (2006), reporting is described as follows:

Phase 6 begins when you have a set of fully worked-out themes, and involves the final analysis and write-up of the report. The task of the write-up of a thematic analysis,

whether it is for publication or for a research assignment or dissertation, is to tell the complicated story of your data in a way which convinces the reader of the merit and validity of your analysis. It is important that the analysis (the write-up of it, including data extracts) provides a concise, coherent, logical, non repetitive, and interesting account of the story the data tell – within and across themes. (p. 23)

As this thematic model is embedded within a larger critical discourse analysis, it was proper to bring the critical aspects of this dissertation back into this step of stage one of the cda. In accordance, the themes produced from step two were re-defined, analyzed, and described with regards the Building Tasks encompassed in the themes. For example, in this step of the analysis I noted the composition of a theme as the combination of certain Tasks, like Identity (e.g., associating as a nurse), Relationship (e.g., as a nurse it was easier to talk to patients), or Significance Tasks (e.g., being able to identify a challenge in the clinical immersion is a significant part of the design process) (Gee, 2004, 2008). In doing so, I advanced the step of critically understanding why certain language patterns used by students (as represented by the Building Tasks) were significant to understanding how they related to the research questions centered around power for this dissertation (Gee, 2004, 2008).

Outlining Stage Two of the Critical Discourse Analysis

The purpose for situating this thematic analysis of the tagged, archival data within Gee's (2004, 2008) larger, critical analytical framework is to uncover the power dynamics within the discourse developed by students enrolled in one semester of the CIDI course. Despite being guided by Gee's (2004, 2008) Seven Building Tasks, the initial analysis of these themes alone does not engage in the postmodern, critical lens necessary which underscores that language is not

a neutral medium, but rather reflective of socially constructed, contextually relevant symbols that influence actions, exchanges, and meaning (Gee, 2004, 2008; Rogers, 2004; Rubin & Rubin, 2012). In turn, utilizing such a lens allows for the understanding of such themes in relation to the power dynamics and social constructions that produced them, rendering this analysis more aligned with a cultural studies project with political intentions (Hytten, 1997; Rogers, 2004; Wright, 1996).

This process was completed in several steps. Upon reviewing the themes and sub-themes produced in stage one of this analysis, I delved back to analyze the thicker descriptions of the themes that emerged from the data. This entailed situating these themes within the discursive exchanges produced by the students and analyzing why these students were utilizing certain Building Tasks to describe specific scenarios (e.g., nursing students utilizing Identity or Relationship Tasks to express association with the nursing profession) or responding to a question utilizing a preference for certain Building Tasks over others (e.g., an engineering student using Sign Systems Tasks to explain problem solving processes). As Rogers (2004) denotes, language is often linked to action which then carries social implications; these implications, in turn, are situated within power dynamics that dictate the meaning, value, and subsequent actions resulting from these exchanges.

I then utilized Gee's (2004) Theoretical Tools of Inquiry (i.e., *Discourses, social languages, situated meanings, and figured worlds/cultural models*) to guide my understanding of these themes, sub-themes, and the Building Tasks that defined them. The purpose for doing so was to make implications of the language being used to reflect on experiences and observations within a collaborative learning environment to help understand how power is constructed in these environments and how it influences knowledge construction (Brissett & Mitter, 2017;

Rogers, Malancharuvil-Berkes, Mosley, Hui, & O'Garro Joseph, 2005). In making these connections, I placed these themes and their thicker descriptions within a larger social context that reflect not only the contextual markers associated with the CIDI course, but also larger societal, historical, and cultural markers that influence these students' values and meaning within their collaborations (e.g., what does it mean to be an engineer versus a nurse in the clinical immersion setting versus the design setting?). In this stage of the analysis, I looked at the themes as representations of experiences and observations as reflected by student responses captured in the archival data. It was not simply identifying the Building Tasks associated with the experience and observations that are noted in the tagged, CIDI course archival data, but taking it a step further and exploring the larger societal, historical, and cultural notions that guide the use and preference of such tasks within students' discursive practices.

As the entirety of this analysis will be fully developed in chapter five, I will leave examples and details of these associations to be featured then. I envision this analytical process to be an expansion of the thematic analysis through a critical lens. That is, much like a funnel I reduced a large amount of data into digestible themes in an effort to expand on these themes through a critical lens which will provide the pedagogical implications that will affect change in collaborative learning environments. In the case of both analyses, an audit trail was created and both stages of analysis were reviewed to strengthen the accuracy and credibility of the overall research (Rubin & Rubin, 2012).¹⁸

Reflexivity

An important aspect of all naturalistic and interpretive constructionist work is the assumption and understanding that knowledge is not a neutral medium (Rubin & Rubin, 2012).

¹⁸ This entailed repeated member checking discussions which are detailed in chapter five.

It is understood that research rooted in these paradigms is influenced not only by the social, historical, and cultural contextual factors in which such research is being conducted, but also by the perspectives of the participants and the researchers engaging in such work (Clandinin & Connelly, 2009; Rubin & Rubin, 2012). As Gee's (2004, 2008) approach to *critical discourse analysis* is heavily influenced by other qualitative traditions including narrative analysis, it is important to denote the role of the researcher in the analysis of this type of work (Rogers, 2004; Rubin & Rubin, 2012). Rubin and Rubin (2012) contend that research anchored in these paradigms, especially those with a postmodern or critical slant, denote that the researcher's view is only one of several ways to analyze such work and thus holds no more legitimacy than those being studied. Riessman (2008) emphasizes that in narrative traditions, the role of the researcher is often in *co-constructing* knowledge with the participants of the research: that is, understanding that the researcher, in conducting the research, is also influencing what is being investigated through their own actions, thoughts, and exchanges with the participants. In either case, noting the role and the positionality of the researcher with respect to the work being done is essential for establishing the credibility and accuracy of such work (Rubin & Rubin, 2012).

For this purpose, I intend to outline these points in two ways: describing my own background and proclivities as well as how I understand my role in this type of research as a *human instrument* (Marshall & Rossman, 2006). In this dissertation, I aim to examine how power is constructed and influences the experiences, interpretations, interactions, and internalizations offered by student reflections recorded in archival data originally collected from the CIDI course. This is a form of research that requires intro-perspective analysis of the positionality of the researcher in respect to these very dynamics (Riessman, 2008; Rubin & Rubin, 2012). As a current doctoral student, my research interests are primarily centered on

collaborative learning practices, issues of diversity, and understanding the link between pedagogical practices and learning theories. In conducting this work, I acknowledge that I have my own proclivities that fall towards employing theoretical, sociological, and philosophical perspectives to better understand these topics. This was noted in the reflexivity journal that I kept throughout my role as consultant for the CIDI course; my observations of student interactions were often coupled with links to motivational theory, critical theory, or social theory items that I learned in my academic coursework towards my doctorate. My own professional activities as a contributing researcher to the Renaissance Foundry group's educational initiatives also provided an advantage to understanding the pedagogical framework of the CIDI course (which integrates the Foundry Model) and its learning objectives (Arce et al., 2015; Sander & Geist, 2016). This framework was also included in my own notes throughout the course which observed how certain aspects of the Foundry (e.g., group contracts, knowledge transfer) were influencing student interactions and progress towards their prototype of innovative technology (Arce et al., 2015).

Due to these academic and professional interests, I was naturally passionate about collaborating with the principal investigators in the larger study. Throughout the duration of the data collection process, I found myself learning from the students we were interacting with and fascinated by the insights they provided with respect to the design of the course. I also noted that I reflected on a myriad of ways such data could help advance any pedagogical understandings by utilizing the abovementioned frameworks as forms of analysis. In turn, this influenced the lens through which I interpreted different responses. For example, I interpreted student responses as an educator or as an educational researcher, often having to note that such interpretations need to be situated in the framework of an undergraduate student who does not necessarily understand

the pedagogical or learning objectives of the curricula. During the data collection process, I was also careful to note any external distractions (e.g., the noise from the 3D printer) or internal issues (e.g., the flow of the semi-structured interview questions) that might have interrupted the data collection process. These notes were utilized in the transcription process. For instance, the continual noise present in the background of some of the recordings were identified and integrated into the transcript for more clarity.

Another point taken from the reflexivity journal is that throughout my time as a consultant I noted that alongside the students in the CIDI course, I was also learning from the two professors of the course. My learning, however, was not necessarily concerned with the content of the course but rather from the pedagogical dynamics presented by the two principal investigators of the course. As the CIDI course is relatively new based on the presented content and collaborative design, the implementation, pedagogical framework, and collaboration between the two principal investigators were arguably innovative features of the course that were of valuable interest to my research agenda (Arce et al., 2015; Sanders & Geist, 2016). In my reflexivity journal, I note that I would hold frequent, informal conversations with both of the principal investigators during my time in the field which heightened my awareness of student dynamics, design progress, and learning processes. In our conversations, we would often focus on observations that we found interesting and would try to note the reasons for our interests. For example, early in the semester we noted that when students came back together for a group discussion, they would often revert back to speaking with peers from their same discipline; wherein, towards the end of the semester, it was noted that students tended to stay within their interdisciplinary groups. We also kept note of which pedagogical techniques helped to each students within their teams rather than with their peer groups. These conversations and the notes

provided from my reflexivity journal offer valuable insight into vital details pertaining to the background or foundational dynamics that drive the progression of the course from the vantage point of the individuals who envisioned the design.

Finally, I also recognize my contribution, and that of the principal investigators, in our roles as *human instruments* in the interview processes regarding the focus group interviews and the debriefing discussions (Marshall & Rossman, 2006). The focus group interviewing and debriefing discussion sessions for the larger study from which this archival data is derived was led primarily by the two principal investigators of the CIDI course. These individuals are two academic scholars whose educational research focus is dedicated to understanding creative and critical thinking and prototype development. As a consultant for this work, I participated in all focus group interviews but did not lead any debriefing sessions or lead any of the pedagogical work related to the CIDI course. For the entirety of the semester in which the data was being collected, I felt relatively submerged into the environments of the student-participants (Marshall & Rossman, 2006). To the extent possible, efforts were made to recognize these actions, expectations, and predispositions in order to understand their influence in the course of collecting the data for this larger study (Marshall & Rossman, 2006). These efforts were recorded in the reflexivity journal, as well as the aforementioned informal conversations that all three researchers held throughout the data collection process. This embedded participation in the data collection process, in turn, effectively influenced my understanding and familiarization with the context and processes in which this data was collected; these influences are arguably present in the critical analysis of this archival data for this dissertation.

Trustworthiness

Trustworthiness is a common standard by which naturalistic and interpretive constructionist work can be properly judged against standards establishing the methodological soundness of such work (Erlandson, Harris, Skipper, & Allen, 1993; Lincoln & Guba, 1985). Scholars working within these paradigms have categorized four forms of analyzing trustworthiness: credibility, transferability, dependability, and conformability (Erlandson et al., 1993; Lincoln & Guba, 1985). Through my role as a consultant for the larger research project, I was afforded the opportunity to engage in the data collection process and apply several methods to establish trustworthiness with regards to the original, qualitative dataset. I argue that these methods can be transferred to this data's use as archival, as the methods were meant to ensure the credibility and accuracy of the data regardless of its intended use. In an attempt to offer a degree of trustworthiness for this study, each of these categories will be addressed.

Credibility can be defined as activities and checks performed by the researcher in an attempt to increase the probability that the findings will have high truth values (Erlandson et al., 1993; Lincoln & Guba, 1985). Three research methods developed by scholars to establish credibility were utilized: prolonged engagement, persistent observation, and reflexive journaling (Erlandson et al., 1993). For this analysis, these methods allow me to better understand the context in which the data was collected and decipher idiosyncrasies associated with student comments that may reflect particularities of the course. Transferability refers to the degree to which the findings of a naturalistic and interpretive constructionist study can be relevant to other locations, populations, or programs (Lincoln & Guba, 1985). Although this study concentrates on undergraduate students of two particular disciplines enrolled in one unique course – upper level undergraduate nursing and chemical engineering students enrolled in the CIDI course - the

findings can inform educational research pertaining to this population or pedagogical research concerning collaborative learning. Two primary methods listed by scholars as ways in which to establish transferability were used in the larger research project: purposive sampling and reflexive journaling (Lincoln & Guba, 1985). For this analysis, I add another method in thick description as I provide extensive detail regarding the context of the course, my involvement in the course, and examples of student discourse that pertain to the analysis (Erlandson et al., 1993).

Dependability represents the extent to which the findings in this dissertation would appear in repeated analysis (Lincoln & Guba, 1985). Scholars argue that it is essentially an extension of credibility and thus similar methods can be used to establish the dependability of research (Lincoln & Guba, 1985). Aligned with these notions, I reiterate that methods including prolonged engagement, persistent observation, and reflexive journaling were used as part of the larger research study to establish credibility and therefore dependability measures (Erlandson et al., 1993; Lincoln & Guba, 1985). These steps were furthered by the use of an inquiry audit wherein others reviewed the process by which I arrived at my results in an effort to ensure that all perspectives were represented and the findings accurate (Lincoln & Guba, 1985). Finally, confirmability refers to the extent to which the research findings are determined by the participants in the study rather than the biases, interests, and preconceived notions of the researcher (Lincoln & Guba, 1985). In order to establish confirmability, it is essential that the researcher acknowledges her position as a *human instrument* and underscore the contributions that she and her background make towards the co-constructing process (Lincoln & Guba, 1985; Marshall & Rossman, 2006; Riessman, 2008). For this purpose, in the larger study the researchers engaged in triangulation methods, reflexive journaling, and member checking when possible. For this dissertation, I openly acknowledged my role in the data collection process and

the proclivities that I brought to the data analysis stages of this dissertation when engaging with this archival data.

Limitations

As noted, the data for this dissertation is archival data collected from a larger mixed-methods study intended to analyze the creative and critical thinking, teamwork, and communicative skills of the students enrolled in the CIDI course. Consequently, due to this involvement in the larger study, there are several sources of strengths related to this dissertation, some of which were alluded to in the trustworthiness section of this paper. However, because the current research is archival data from this larger study, it was difficult to delve deeper into topics related to power asymmetries and communication patterns regarding knowledge construction that are the primary focus of this dissertation. Although this data as a secondary source offered snippets of participant perspectives related to these issues, the primary focus of the focus group interviews and debriefing notes was to capture topics related to the larger project. These topics were general in nature and were centered on inquiries regarding communication strategies, descriptions of overall experiences in the different settings of the CIDI course, and queries regarding the development of the prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). Although this meant that this current strand of analysis on power, communication, and knowledge construction emerged from the actual interactions with the participants which is relevant and necessary for the naturalistic and interpretive constructionist paradigms, at the same time I understand that this data is constrained via the semi-structured protocols and worksheet questions that did not allow for the conversations to steer too far from the primary topics related to the larger study. In the future, a

research study designed around the central research questions of this dissertation would provide more robust insight into the power dynamics being studied.

Further, Gee (2004, 2008) posits that *critical discourse analysis* and the traditions that inspire such naturalistic and interpretive constructionist work are limited by what he refers to as the *frame problem*. That is, as discourse is theoretically influenced by an indefinite amount of social, historical, cultural, and contextual markers, there is always the possibility that new considerations and interpretations can influence the way in which critical discourse analysts understand and analyze the text (Gee, 2004, 2008). Thus, as the context continues to expand (e.g., from course setting, to community settings, to home settings, to larger, national settings) the analysis is always vulnerable to change (Gee, 2008). However, Gee (2008) also notes that this could be a vital *cda* tool as well: as critical discourse analysts, we must acknowledge the frame problem is an inherent part of naturalistic and interpretive constructionist work that recognizes that multiple truths exist alongside one another. This, in turn, forces the analyst to specify the context in which the research is being conducted, the theoretical boundaries of such contextual markers, and provide thick descriptions that make such work unique and interesting (Gee, 2008; Rogers, 2004).

Albeit these limitations, I contend that the strengths of this dissertation rest in the foundation that the research outlines for advancing the pedagogical and educational implications regarding collaborative learning environments. Despite the abovementioned limitations, a certain degree of trustworthiness was established in the larger research study that, as a consultant, I argue are transferred to this dissertation that uses the data as archival. Again, the use of this data as archival is relevant and appropriate for the conceptual and analytical frameworks proposed in this work as *critical discourse analysis* emphasizes the use of textual

documents for such an analysis. In the form of focus group transcripts and debriefing notes, this archival data provides what Gee (2004, 2008) calls *interactional representations* of discursive patterns that provides a unique example by which to analyze student exchanges within a specific contextual environment and social system. The methodological frameworks of this dissertation also permit for an understanding of collaborative work to be established through a critical, postmodern lens (Rogers, 2004). This opportunity offers a space to uncover underlying power asymmetries within collaborative learning environments and analyze them in an effort to improve future work in this area.

The Next Steps

The purpose of chapter three was twofold; to present the archival data utilized for this dissertation (including all the relevant background information pertaining to the origins of this data) and to outline the data analysis methods used for this research. Through the sections delineated in this chapter, my intention was to introduce all of the relevant background information associated with the larger research project from which this data is derived. In doing so, I wanted to be transparent about my role in this data collection process, my understanding of this data as archival for the purpose of this dissertation, and expand on why use of this data is appropriate and relevant for a dissertation utilizing *critical discourse analysis* as a conceptual framework. From this, I re-introduced the significance of the conceptual and analytical frameworks for this dissertation as a means to situate not only the techniques I utilized as tools for this data analysis, but also the rationale and mechanics for how this was accomplished. Situating this work within a naturalist and interpretive constructionist paradigms, I followed scholarship recommendations for incorporating the information necessary to ensure the credibility and accuracy of this type of research.

As with the previous chapters, I provide a brief roadmap of what can be expected in the remaining chapters in an effort to help readers understand the significance of each chapter within the structure of this dissertation. I have hitherto outlined this dissertation's research design, objectives, and significance. I have rooted this design within a *critical discourse analysis* conceptual framework, and Gee's (2004) approach to *cda* as the analytical framework. Chapter two outlined the extant literature that helped to understand various aspects of collaborative learning through three different research lenses. Chapter three presented information relevant to introducing the archival data utilized for this work. In chapter four, I build on this foundation by presenting the context of the CIDI course in detail. The purpose for doing so is to accomplish what Gee (2004, 2011) contends to be part of the foundational difference of *critical discourse analysis* – connecting the actual analysis to a rich, deep contextual framework which helps to identify and explore the power dynamics inherent within discursive exchanges that are specific to a particular social setting. Providing a thick description of the CIDI course prior to delving into the analysis of the archival data collected from this course will provide the contextual framework by which such critical implications can be inferred.

CHAPTER 4

THE CONTEXTUAL FRAMEWORK:

PRESENTING THE CONTEXTUAL MARKERS OF THE CIDI COURSE

Introduction

Several frameworks have hitherto been introduced in this dissertation as an effort to position this research within the theoretical foundations that provide relevance and credibility to this work. In chapter one, I presented the research design, questions, and objectives regarding this dissertation and contended that the purpose is to examine how power manifests in the discursive practices of students enrolled in a collaborative learning course at the undergraduate level. I introduced the Clinical Immersion at Disciplinary Interfaces (CIDI) course as the contextual framework for such research and presented the rationale for this dissertation as a cultural studies project. To explicate how this research was completed, I introduced *critical discourse analysis (cda)* as the conceptual framework and Gee's (2004) approach to *cda* as the analytical framework.¹⁹ Both of these frameworks are aligned with the overall purpose of a cultural studies project. In chapter two, I presented literature from three fields that are relevant to this dissertation: group dynamic models, communication studies literature, and critical social theory scholarship. I chose these fields as each provides a unique lens by which to understand collaborative learning environments. However, I situated this dissertation at the intersection of these fields as, through the use of *critical discourse analysis*, I am employing an interdisciplinary

¹⁹ As noted in previous chapters, I am utilizing Rogers' (2004) conceptualization of *critical discourse analysis (cda)* as it denotes a more holistic version of the field.

lens which attempts to connect textual analysis to social reality (Fairclough, 2013a; Rogers, 2004).

Within this structure, the purpose of chapter three was twofold: to present the archival data that will be utilized for this dissertation and to delineate how Gee's (2004, 2008) approach to *critical discourse analysis* will be employed as the analytical framework for data analysis. In presenting the archival data for this dissertation I utilized the requisites aligned with the naturalist and interpretive constructionist research paradigms to provide relevant information regarding the origins of this data (Rubin & Rubin, 2012). These sections presented the relevant background information pertaining to the larger research study within which this data was collected, my role in this data collection process, and the processes that were involved in the actual collection of the data. I also outlined the rationale for using this data as archival data for this dissertation and detailed the eight focus group transcripts and twenty-six debriefing notes that comprise this archival data. As part of the second objective, the conceptual and analytical frameworks presented in chapter one were re-introduced in chapter three and the mechanics for the actual analysis were presented.²⁰

Purpose and Organization

The purpose of chapter four is to provide a thorough contextual backdrop with regards to the CIDI course prior to entering into the analysis of the archival data from this course. As an analysis rooted in a *cda* conceptual framework - which is informed by naturalist and interpretive constructionist research paradigms - it is understood that delineating the contextual markers

²⁰ This analysis will be the focus of chapter five and therefore examples to develop this connection will be described in the framework of that chapter.

within which the data is situated is necessary (Rubin & Rubin, 2012). This is because *critical discourse analysis* is anchored in postmodern, critical assumptions of knowledge which indicate that the construction of knowledge is a multi-faceted process that must take social, historical, and cultural factors into account in order to understand the elements that influence individual interpretations and contributions to this process (Fairclough, 2013a; Rogers, 2004; Rubin & Rubin, 2012). Simply put, knowledge cannot be separated from the individual(s) or the context in which that knowledge was constructed (Rubin & Rubin, 2012; Shayer, 2003; Vygotsky, 1978).

Critical discourse analysis scholars therefore emphasize that such research should acknowledge the importance of context, complexity, and individual *situatedness* within the discursive process to truly investigate knowledge construction and subjectivity (Gee, 2008, 2011; Rogers, 2004). The contextual importance of *cda* research allows scholars to implicate that most *cda* projects are therefore unique (Gee, 2008; Rogers, 2004). As individuals integrate prior knowledge to compose new knowledge via discursive practice and formation, researching such a process must be rich in detail to portray the uniqueness of the context (Gee, 2011; Lincoln & Guba, 1985). This chapter is my effort to provide such richness in detail, wherein I describe the CIDI course through varying elements that I believe have influenced the contextual markers within which the students enrolled in this course have worked. It is also my effort to address the *frame problem* introduced by Gee (2004) and provide boundaries within which this research is to be developed.²¹

²¹ The frame problem was introduced and developed in chapter three as part of the limitations of *critical discourse analysis* work (Gee, 2004, 2008).

I begin this contextual backdrop by presenting the larger, postsecondary landscape in which the CIDI course was created. This postsecondary landscape spurred the inspiration, design, and several of the curricular elements that were integrated into the course design and therefore need to be outlined. The following section then goes specifically into the curricular design of the course; this entails detailing how the learning objectives of the course fits into the larger postsecondary context, a deeper understanding of the three phases of the course, and a recap of the pedagogical framework that was introduced in chapter one. These two sections lay out the foundation for understanding the learning theory (i.e., social constructivism) and the learning strategy (i.e., collaboration and the facilitation of knowledge construction) that inform the course and the activities that the students must complete as part of their learning in the course. I end this section by outlining why this is a unique contextual scenario in which to study student discourse and discuss the next steps associated with the critical discourse analysis for this dissertation.

The Postsecondary Context

Within college or university education the increase of initiatives geared towards fostering creative thinking among undergraduate students is relatively recent and transcends disciplinary boundaries. The surge of resources dedicated to the creation of creative thinking centers, courses, and programs (e.g., The Massachusetts Institute of Technology (MIT) Media Lab, Stanford University's d.school, Oklahoma State University's Institute for Creativity and Innovation, The University of Michigan at Ann Arbor's interdisciplinary creative-process course) at the postsecondary level within the last decade alone provide evidence to this point (Klawe, 2017). Arguably, the urgency for developing this type of skill in undergraduate students is derived from the ever-changing nature of multiple, social challenges that blur the lines of

traditional, content-rich, disciplinary bases (Arce et al., 2015; Dougherty, 2012; Felder & Brent, 2015; National Academy of Engineering [NAE], 2003, 2005). The National Academy of Engineering (2010), for example, identified a myriad of multifarious issues – concerning sustainable energy, healthcare, and education, among others – which not only cross several disciplines, but also require multifaceted, and often uniquely crafted, solutions. As national institutions, employers, and scholars alike continue to note the necessity of graduates fluent in creativity, the shift towards pedagogical approaches that facilitate such thinking at the undergraduate level will also continue to rise (Arce et al., 2015; Felder & Brent, 2015; Martin, 2015; Sanders & Geist, 2016).

Convergent research environments have subsequently been heralded as a strategy that harnesses collaboration and design principles in an effort to engender innovative thought (National Academy of Science [NAS], 2014). In order to establish convergent research spaces on campuses, postsecondary settings have increased the amount of partnerships between programs, departments, and institutions. For example, the MIT's Little Devices Lab, in tandem with the Robert Wood Johnson Foundation, have recently launched an initiative to partner up with local healthcare facilities in an attempt to bring practitioner perspectives to the research generated in their undergraduate student labs (Young & Weymouth, 2013). Within universities, programs and departments are partnering to create hybrid curricula options for their students interested in issues at the cross-section of a myriad of disciplines (Sanders & Geist, 2016). A few examples include the option of art-based electives in traditional science, technology, engineering, and mathematics (STEM) programs, or design inspired classes integrated into business leadership, engineering, and communication programs (Halverson & Sheridan, 2014; Klauwe, 2017).

Postsecondary creative thinking initiatives have also taken into account the design principles that are inherent in convergent research and have utilized them to promote such programs as the Maker movement. The Maker movement can be described as an influential culture inspired by a hands-on learning approach that integrates creating, designing, and innovating within traditional academic spaces (Dougherty, 2012; Martin, 2015). Reflecting this influence, the Maker movement has motivated the construction of spaces like the Makerspace areas in university libraries which hold a variety of prototyping and modeling tools including 3D printers, laser cutters, and advanced digital software (Halverson & Sheridan, 2014; Martin, 2015). Such spaces allow students the opportunity to learn through project building activities that integrate a wide variety of skills based on the student's interest (Dougherty, 2012; Halverson & Sheridan, 2014).

It is precisely within this postsecondary context that the CIDI course, which serves as the pedagogical context for this dissertation, was created. Specifically, it was inspired from the host university's creative thinking initiatives that led to a partnership of faculty from chemical engineering and nursing to envision a joint, undergraduate clinical immersion course (Sanders & Geist, 2016). In addition to the exposure provided by the collaboration created by these two departments, the course is rooted in a pedagogical framework that advances collaboration and design, integrates the university's Makerspace, resources from the local hospital and emergency clinic, and the university's Steelcase room (designed for teamwork courses) to elevate students' engagement in convergent research practices (Sanders & Geist, 2016). The following provides a contextual reference for this course that highlights the significance and relevance of this dissertation with regards to pedagogy geared towards convergent research.

Creative Engineers and Nurses

Albeit the call for increasing the creative thinking capacity of undergraduate students crosses several disciplinary boundaries, national calls from think tanks within engineering and nursing have spearheaded the prioritization of the development of this characteristic within these particular academic fields (Sanders & Geist, 2016). For the field of engineering, the importance of fostering creative engineering professionals at the undergraduate level coincides with the field's pedagogical call for Holistic Engineering and Educational Reform (Grasso & Burkins, 2010; Grasso, Burkins, Helble, & Martinelli, 2008). In this academic call, engineering professors emphasized the need to re-think engineering curricula to include more cross-disciplinary experiences, leadership training, and innovative approaches to problem formulation (Grasso et al., 2008). For Grasso and colleagues (2008), engineering education should create global leaders described as, “decision-makers who actively shape our future with both proven technical engineering ability as well as creative, cost-effective, and innovative management” of complex issues (p. 27).

The importance of creative thinking within the undergraduate engineering curricula has been augmented with successive reports from national engineering organizations identifying innovation as a necessary skill within the profession (Grasso et al., 2008; Rogers & Frueler, 2015). For example, in its vision for the engineer of the year 2020, the National Academy of Engineering (2005) updated the attributes that a successful engineer should possess to include creativity (i.e., invention, innovation) among the top ten skills alongside more traditional skills (i.e., strong analytical skills, high ethical standards). Industry reports also underscore that engineers must not only know their technical content, but they must have the communication skills, teamwork skills, the focus to navigate a complex objective within a multifaceted

environment, and the client interaction and management know-how to be successful within the current engineering workforce (Felder & Brent, 2015; Rogers & Frueier, 2015). As Grasso, et al. (2008) posit, these holistic professionals are not only the ones identifying solutions to complex problems, but they are also the designers who are defining the initial problem.

National organizations within the field of nursing have similarly emphasized the need to increase creative thinking skills as a necessary part of the progression of the profession. As leadership and organizational practices influence the way patients receive care, nurses in practice areas throughout the healthcare profession have received an increase in autonomy to deliver such care (Broome, 2016; Jasovsky, Morrow, Clementi, & Hindle, 2010; Sanders & Geist, 2016). This has, in turn, encouraged hospitals to allow nurses the opportunity to become patient care innovators – individuals that not only provide patient care, but also identify problems with delivery and potential evidence-based solutions (Sanders & Geist, 2016; Young & Weymouth, 2013). A report from the National Research Council (NRC) (2009b) entitled, *The Future of Nursing: Leading Change, Advancing Health* also acknowledged the importance of these changes, identifying innovation as a key characteristic in nursing professionals.

The academic nursing community has been quick to respond to these calls for innovation at the professional level, advancing pedagogical techniques that aim to enhance creative thinking and innovation. In a recent publication, Broome (2016), Dean and Vice Chancellor for Nursing Affairs at Duke University and Editor-in-Chief of *Nursing Outlook*, forewarned that the nursing discipline could not afford to lose graduates in the major due to a lack of training in creative thinking skills. Broome (2016) acknowledged that nurturing innovators within the profession is not only essential to helping the profession grow, but to having successful graduates in an ever-more complex and evolving field. More nursing programs have subsequently sought to

reinvigorate the traditional curricula by offering design-based clinical experiences, theory based iterative learning techniques for patient care, and cross-disciplinary courses (Commission on Collegiate Nursing Education Accreditation [CCNEA], 2016; Young & Weymouth, 2013). Along this line the Maker movement has again made an impact as a MakerNurse sub-movement has focused on developing design-based nurse curricula in tandem with postsecondary institutions (Young & Smith Gonzalez, 2015; Young & Weymouth, 2013). According to one report, such a movement capitalizes on nursing expertise because, “nurses are on the front lines of health care delivery and closer to the patient than conventional engineering labs in America,” making them, “uniquely positioned to design break-through solutions to improve care” (Young & Weymouth, 2013, p. 1).

A Synergistic Pairing

In addition to the call for academic reform geared towards creativity in both of these fields, the pairing of engineering and nursing further converges due to national research priorities that continue to permeate in the area of healthcare (NAE, 2003, 2010; NRC, 2009a, 2009b). The focus on healthcare priorities is not misguided as such challenges present a space that can leverage the expertise of both fields to produce innovative solutions to multifaceted issues (NRC, 2009a, 2009b). As evidence to this fact, organizations from both engineering and nursing have issued *grand challenges* recognizing this synergy (CCNEA, 2016; NAE, 2010; Sanders & Geist, 2016). Grand challenges can be described as a call for specific scientific or technological advancements that could eliminate a hindrance concerning an issue impacting global development (Varmus, Klausner, Zerhouni, Acharya, Daar, & Singer, 2003). A report released by the National Academy of Engineering (NAE) (2010) outlined fourteen grand challenges facing the discipline, including two that relate directly to healthcare: engineer better medicine

and advance health informatics. In 2003, The Global Health initiative also detailed fourteen grand challenges in global healthcare issues (Varmus et al., 2003). Once more, among those listed, several blurred into the expertise of engineers, including developing new technologies, developing new chemical strategies, and discovering new drugs and therapies for ever-evolving diseases (Varmus et al., 2003).

These calls have resonated with both fields in the academic community. Noting the interdependence of these fields, a report published by the National Academy of Science (NAS) (2014) in collaboration with three leading national organizations – the National Academy of Engineering, the Institute of Medicine, and the National Research Council – expressed urgency for convergent research in these disciplines. This call implores academic organizations to create administrative, teaching, and research partnerships which focus on approaches to problem-solving that, as noted, cross disciplines, creates a culture of collaboration, and engender creative thinking (NAS, 2014). With the support of national organizations, several universities have taken advantage of existing resources relevant to several fields to build the infrastructure necessary to create such partnerships (Felder & Brent, 2015; Sanders & Geist, 2016; Young & Smith Gonzalez, 2015). Thus, despite the fact that the rise of collaborative partnerships at the postsecondary level has far outstretched the barriers of any specific disciplines, the interest and need for collaboration between the fields of engineering and nursing is one that has most aligned to both national and postsecondary initiatives.

The Course Context

Clinical Immersion at Disciplinary Interfaces

Capitalizing on the creative thinking initiatives fostered within the current postsecondary context, faculty from the Department of Chemical Engineering and the School of Nursing from a mid-sized state university created the Clinical Immersion at Disciplinary Interfaces (CIDI) course.

The course intentionally leverages on-campus campaigns promoting collaborative learning and design by integrating the university's Makerspace initiative with a student-team, challenge-based pedagogical framework (Arce et al., 2015; Sanders & Geist, 2016). Effectively, the purpose of the clinical immersion course is to facilitate student-teams' engagement with the design of an innovative prototype of technology aimed at addressing a student-identified healthcare challenge (Arce et al., 2015; Sanders & Geist, 2015). Within each discipline, the course aims to attract students that are interested in biomedical healthcare challenges relevant to both fields. For nursing students this means that the course reinvents the concept of traditional nursing clinicals – wherein nurses gather professional experience within a clinic or healthcare setting – to shift the focus from patient care to improving such care through innovative ideas (Sanders & Geist, 2016). For engineering students the course offers practical experience in the transference and application of engineering content knowledge towards a feasible technological innovation in the field of healthcare (Arce et al., 2015; Sanders & Geist, 2016).

Ultimately, the aforementioned national calls for convergent research at the interface of these disciplines, in tandem with the necessity for adaptability and creative thinking skills in both professions, highlight the significance of this unique course (Sanders & Geist, 2016). The pairing of these disciplines to create a purposeful, cross-disciplinary experience provides the ideal academic setting in which to observe and critique the application of both collaborative learning and design principles within the undergraduate curricula. Further, the course allows for a contemporary example of how postsecondary instructors are reacting to both the broader academic shift to pedagogy directed towards creative thinking and a professional call to better train future professionals in this area within their respective fields. As the data and pedagogical

implications for this dissertation derive from this course, it is imperative to outline the logistics and the pedagogical framework driving its learning objectives.

Course Logistics

The CIDI course is dually listed in the university catalog as an upper level, three-credit hour undergraduate course for interested chemical engineering and nursing students. Thus far the course has been taught for four semesters and, mimicking a clinical session, was designed to meet in three-hour blocks, one time per week, throughout each designated semester. The course can be described as divided into three phases: orientation, clinical immersion, and design. Each phase is anchored to a distinct, primary learning objective that drives the delivery of the context and the experiences of the students in the course.

In the first phase of CIDI (i.e., orientation), the focus is to introduce students from each discipline to the expertise and knowledge that each field brings to the convergent biomedical field. Students are placed in interdisciplinary teams of three to four students, representing both the chemical engineering and nursing fields. Throughout this section of the course, students within the teams are charged with educating their counterparts on various topics relating to each discipline. For example, chemical engineering students are introduced to the nursing fundamentals lab where they can explore a simulated healthcare setting and learn about a myriad of nursing protocols regarding infection control, patient interaction and care, and the Healthcare Insurance Portability and Accountability Act (HIPAA), *inter alia* (Sanders & Geist, 2016). In turn, chemical engineers are asked to introduce nursing students to the engineering laboratories in which they work, the research they are conducting, and the tools available at their disposal. Within this section student teams are encouraged to begin constructing a shared language and form accountability measures outlined in a teamwork contract created by the students (Sanders &

Geist, 2016).

In the second phase student teams participate in various clinical immersion experiences at the local hospital, partnering clinics, and emergency facilities. These experiences include but are not limited to: the Emergency Room, the Cardiovascular Intensive Care Unit, the Intensive Care Unit, the hospital's Device Clinic, and the ambulatory department, among others. Four to five total class sessions are dedicated to these immersion experiences. Unlike traditional clinical immersion experiences – where patient care is the objective – in this phase, student teams are charged with identifying a feasible healthcare challenge within their immersion experiences. Motivated by this objective, student teams are encouraged to engage in research-based techniques (e.g., debriefing notes, reflections, observations) with a variety of community members (e.g., doctors, nurses, patients) in each setting.

This student-identified challenge provides the impetus for the next phase of the course centered on design (Arce et al., 2015). During this phase student teams meet for the remainder of the course to work through an iterative design process that culminates in the creation of a prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). The design process for student teams includes engaging in iterative brainstorming and planning sessions that aim to develop and test their initial ideas concerning their prototype idea. Utilizing the resources from the university's MakerSpace, in conjunction with the nursing and chemical engineering laboratories, such testing can include the production of both low-fidelity (e.g., drawing, electronic mapping, graphic design) and high-fidelity (e.g., the creation of a three dimensional model) prototyping models (Martin & Hannington, 2012). It is emphasized that the prototypes should address the challenge and provide a plausible opportunity to improve patient care (Arce et al., 2015; Sanders & Geist, 2016). At the conclusion of this phase, student teams present their

overall journey (i.e., identifying the challenge, brainstorming process, testing, and modeling) and final product to representatives from the university and the community who provide feedback to the teams (Sanders & Geist, 2016).

The Pedagogical Framework

As mentioned in chapter one and three, the CIDI course is anchored in two pedagogical frameworks that provide the foundation for developing creative thinking via collaboration: the Renaissance Foundry (hereafter the Foundry Model) and the Legacy Cycle (Sanders & Geist, 2016). I present a brief recap of these pedagogical frameworks here in order to lay out the learning theory and strategy of the course in the following section. These are important for understanding how and why students were asked to work collaboratively as part of the CIDI course.

Developed intentionally as a pedagogical framework for fostering creative thinking skills, the Foundry utilizes two academic paradigms – Knowledge Acquisition (KA) and Knowledge Transfer (KT) – to guide students through an iterative design process centered on resolving a student-led, team-based challenge (Arce et al., 2015). Knowledge Acquisition focuses on securing the students' content background regarding concrete information (i.e., theories, equations, models, etc.); Knowledge Transfer focuses on applying the content background developed as part of the KA to a Linear Engineering Sequence (LES) that works towards the development of a prototype of innovative technology through group work and collaboration (Arce et al., 2015). The prototype of innovative technology is intended to be a realistic, relevant, and original idea created to address a student identified challenge (Arce et al., 2015). Envisioned to be an iterative process, students are encouraged to move back and forth between these pillars as many times as is necessary to develop a prototype of innovative technology regarding their

identified challenge (Arce et al., 2015). Several of the challenge-based and team-related components are inspired by elements outlined in the Foundry Model (Sanders & Geist, 2016).

Elements of the Legacy Cycle also help drive the brainstorming, research, and testing components of the course (Sanders & Geist, 2016). The Legacy Cycle is a challenge-based learning model in which students are guided through a six step process that includes: looking ahead and reflection, generating ideas, incorporating multiple perspectives, research and revision, testing your mettle, going public (Klein & Harris, 2007). Students progressing through this cycle are encouraged to deepen their content-based knowledge in order to fully resolve a challenge (Klein & Harris, 2007). Components of this learning model are incorporated into the Foundry Model framework (e.g., generating, testing, and researching ideas) as students go back and forth from the Knowledge Acquisition to Knowledge Transfer paradigm (Arce et al., 2015; Sanders & Geist, 2016). Together the Foundry Model and Legacy Cycle platform on which the CIDI course is structured exposes students to design, collaboration, and interdisciplinary communication specifically geared towards creative thinking (Sanders & Geist, 2016).

The Theories behind the Course

The Learning Theory

Social Constructivism. Within the CIDI course, the overall design of the curricula is based on a social-constructivist approach to learning. The purpose of the course is for students to become active learners throughout the clinical immersion and design phases of the course in an effort to expand their own understanding of a challenge they identified as a team within the field of healthcare (Sanders & Geist, 2016). In particular, the professors of this course were hoping that such purposeful social interaction between students of two different disciplines would help to form unique connections in their learning resulting in creative or new knowledge construction (Anderson, 2013). Effectively, the interdisciplinary nature of the course, in tandem

with the collaborative work in small groups, reflects an adopted social-constructivist framework for learning.

The root of social constructivism lies in the assumptions held by the larger learning theory, *constructivism*. Constructivism as a learning theory within the field of educational psychology is founded on the epistemological argument that knowledge is malleable and made, or constructed, within a contextual set of meanings (Schunk, 2014; Shapiro, 2013; Wink, 2006). In accordance, constructivists posit that learners conceive an understanding of relevant knowledge and skills – physical, abstract, or social – by imposing their own concepts on reality to make sense of what he or she is experiencing (Driscoll, 2005; Fuson, 2009; Larson & Lockee, 2014; Piaget, 2000; Shayer, 2003). Constructivism thus advances that within effective learning environments students must play an active role in the construction of their own understanding of knowledge; in accordance, value is placed on multiple perspectives contributing to the learning process and an environment that fosters such interaction (Munari, 1994; Piaget, 1974, 2006; Schunk, 2014; Shayer, 2003).

Within this larger learning theory, social constructivism highlights the significance of the contextual elements (i.e., students' social, historical, and cultural influences) in learning. Vygotsky's contributions on social learning are credited in the development of social constructivism (Lorenço, 2012). Congruent with constructivist assumptions, Vygotsky contended that individuals did not merely react to their environments; they actively adapted and interpreted their environments for their own understanding (Schrimsher & Tudge, 2003; Schunk, 2014; Vygotsky, 1978). This meant that individuals' relationships within their learning environments – and thus others - was not a static one; rather it was bi-directional, dynamic, and contextual in that both students and their environments were potentially transforming their

cultural mediations by learning from one another (Schrimsher & Tudge, 2003; Vygotsky, 1994). This description brought forth the argument that learning cannot be disentangled from one's context, as social and cultural-historical elements are present in the learning environment and therefore impact overall learning and cognitive processes (Lorenço, 2012; Vygotsky, 1962, 1978). Vygotsky posited that humans developed cultural learning tools (e.g., language, governing institutions, cultural traditions) to assist in understanding these social environments (Schrimsher & Tudge, 2003; Vygotsky, 1978). These cultural learning tools are specific to an individual's own social context and are utilized to mediate the psychological processes that are necessary to understand the immediate environment (Schunk, 2014).

According to Vygotsky (1962, 1978), cognitive growth is a direct result of internalizing culturally learned knowledge and utilizing those developed schemas to continue analyzing one's external environment. Social learning precedes cognitive development in that, "Every function in a child's cultural development appears twice: first, on the social level, and later, on the individual level: first between people and then inside the child" (Vygotsky, 1978, p. 56). Influenced by the theoretical benefits of individual-environment interconnections, Vygotsky posited that humans are a product of their environment (Lorenço, 2012; Schrimsher & Tudge, 2003). Under this assumption, cognitive development could only be explained by first analyzing the cultural-historical factors that influence individual and interpersonal growth (Lorenço, 2012; Schrimsher & Tudge, 2003). These assumptions are fundamental to understanding the role of collaboration in building new knowledge. As unique entities situated within specific cultural, historical, social contextual markers students can and should learn from one another to expand their existing conceptualizations concerning their contextual reality (Schrimsher & Tudge, 2003; Thayer-Bacon, 1998).

The Learning Strategy

Collaboration and Facilitating Knowledge Construction. If social constructivism is the learning theory in which the CIDI course is anchored, collaboration is the mechanism by which the instructors of the CIDI course facilitate such knowledge construction. Effectively, collaboration is considered a learning strategy under the umbrella of social constructivism. As noted, perhaps what the assumptions related to social constructivism underscores is that the most significant aspect regarding collaboration is students' identities and the socially constructed tools they use to communicate as entities situated in these contextual markers (Schrimsher & Tudge, 2003; Thayer-Bacon, 1998). As the purpose of constructivist environments is to construct new knowledge, fostering a healthy level of interactive exchanges among students is therefore necessary for its effectiveness (Anderson, 2013; Barkley, Cross, & Major, 2005; Bruffee, 1993, 1995; Fredrickson, Dunlap, & McMahan, 2013; Larson & Lockee, 2014). For new knowledge to transpire it is not enough for a group to gather together and agree upon common ideas; rather, an active level of exchange, negotiation, difference and dissonance must also occur in order to advance the discourse (Anderson, 2013; Paulus & Nijstad, 2003).

In order to facilitate this knowledge construction, the traditional instructor and student roles must be redefined to align with social constructivist assumptions. As knowledge can only be created within a relevant set of social and contextual markers, both instructors and students often alternate or blur traditional roles to play a more active role within this space (Shapiro, 2013). Students, for example, must drive knowledge creation through an iterative cycle of social interactions, negotiation, and reflection in order to build not only relevancy, but also connections (Fredrickson et al., 2013). Instructors then are charged with actively creating an environment receptive to constructivist exchanges rather than specific content knowledge, including: the

provision of ill-structured learning spaces that integrate authentic student activity; a space that allows for social negotiation between students; the integration of multiple perspectives and modes of representation; time for reflection and reaction to these exchanges; and the encouragement of discovery, or student-centered, learning, wherein the learner drives the direction of the lesson (Narayan, Rodriguez, Araujo, Shaqlaih, & Moss, 2013, p. 170). Thus, rather than the more traditional role of instructor as disseminator of knowledge, instructors must subsequently shift towards the more active role of facilitator of knowledge creation (Anderson, 2013; Fredrickson et al., 2013).

To foster these exchanges, facilitators must not presume to speak for others, but rather, through caring and supportive environments, create opportunities where students can develop their own voice (Thayer-Bacon, 1998). Thayer-Bacon (1998) describes *voice* as subjective, directly linked to thinking processes, and rooted in an individual's feelings, thoughts, intuition, and experiences rendering such expression unique (p. 61). Anderson (2013) underscores that:

For collaboration to occur there must be room for each person and their voice to be unconditionally present. What each contributes must be equally appreciated and valued. Having a full sense of being appreciated and valued leads to a sense of belonging (e.g., to the educational community). A sense of belonging to the community leads to a sense of participation which in turn leads to a sense of ownership thus a sense of shared responsibility. All combine to promote contribution to the product (learning) and its sustainability. (p. 520)

The presence of student voices in a collaborative space is thus one directly linked to agency and power. Without agency students may be unmotivated or uncomfortable with making connections from and with other students, therefore hindering, not promoting, the positive effects associated with collaborative learning spaces (Brooks, 2013; Giroux, 1997; Hytten, 1997). With agency, students become active learners, involved in the discussion and confident that their contributions will be valued and integrated (Anderson, 2013; Thayer-Bacon, 2000).

Within an educational context, the pedagogical strategies that guide students towards collaborative learning are those that build students' relational skills, foster effective communication, and provide an opportunity to develop the tools that can help integrate these conversations into new knowledge (Anderson, 2013; Shapiro, 2013; Thayer-Bacon, 2000). This type of pedagogy necessitates that facilitators engender certain values and attitudes that align with the benefits of collaboration. Practices encompassing these values include: understanding the transformative nature of interaction and fostering such dialogue as part of the lesson; trusting that each student can discern what is critical to their learning within the context of the lesson; respecting that student knowledge can be different and can provide a valuable contribution to learning; and remaining open to student perspectives, appreciating challenges, and encouraging reflection and open discourse (Anderson, 2013, p. 515). Thus, in creating a learning space meant for collaboration, it is imperative to understand not only the identities of the students, but also how these identities become part of the communicative practices that help to create new knowledge (Fredrickson et al., 2013). Understanding how identity, social constructs, and communicative practices impact student learning can, in turn, help refine collaborative learning techniques to create more effective spaces anchored towards knowledge construction.

Within the CIDI course, the facilitators were cautious to implement several of these best practices for facilitating collaboration. For example, they understood that healthy student interactions are necessary for the creation of new knowledge construction and therefore they refrained from imposing too much instructor-lead content in the design of the course (Sanders & Geist, 2016). In addition, the orientation phase of the course was meant to acknowledge the disciplinary differences – and thus identities – that the students held at the beginning of the course with the intention that students might be able to form a common language between acknowledged overlaps concerning their healthcare centered interests (Sanders & Geist, 2016). Another way that the facilitators of the CIDI course were able to provide a supportive environment without imposing their voices onto student dynamics is by offering a high level of student autonomy in both the clinical immersion and design phases of the course (Sanders & Geist, 2016). In both of these phases, students were charged with working collaboratively in these environments to first identify a challenge (i.e., clinical immersion phase) that could then be addressed through an innovative prototype of technology (i.e., design phase). Both facilitators were there as additional resources instead of directive guides throughout these phases.

Offering a Unique Context

The larger study from which the archival data for this dissertation was drawn was situated within the contextual markers presented in this chapter. As noted in chapter three, the initial rationale for collecting data as part of this larger study was to understand the influence of this course on three primary elements: critical thinking, interdisciplinary communication, and prototype design. When I entered into the field as a research consultant for the principal investigators of this larger study, I was initially drawn to the pedagogical innovation that was inherent in this course. This innovation strengthens the unique nature of this course in several

ways: it is product of the current postsecondary landscape which is pushing for curricular reform at the undergraduate level; it integrates several of the nationally recognized critical and creative thinking initiatives that are also part of its university's major curricula campaigns (i.e., experiential learning, the Makerspace movement, entrepreneurial training); it is one of the first interdisciplinary courses to integrate the Foundry Model; and it is a course that integrates best practices in collaborative learning environments as recognized by the awards and funding this course has received to further its progress (Arce et al., 2015; Sanders & Geist, 2016). The newness of this course also presents a unique contextual framework that is at the frontier of several national calls for educational reform at the undergraduate level (NAS, 2014).

I therefore posit that the use of such a course as the contextual framework for this dissertation is relevant and aligned with the overall research objective. As I am interested in examining how power manifests in the discursive practices of students enrolled in a collaborative learning course at the undergraduate level, the CIDI course - an interdisciplinary, undergraduate collaborative learning course - is aligned with both the educational level and the learning practice I am interested in exploring. Further, because the CIDI course was intentionally developed to be aligned with the objectives of a social constructivist framework, the collaborative aspect of this course remains center-stage throughout the duration of the semester; that is, students are engaged in long-term team processes instead of short-term project based collaborations (Barkley et al., 2005; Felder & Brent, 2015). The instructors of the course were also intentional in their design of the course and accurate in their implementation of Foundry Model and Legacy Cycle elements which incorporate best practices in collaborative and critical thinking pedagogical techniques (Arce et al., 2015; Klein & Harris, 2007; Sanders & Geist, 2016). The interdisciplinary aspect of the course additionally provides an interesting element to collaborative learning research as it

purposefully diversifies the collaborative nature of the course through discipline-based perspectives (Anderson, 2013; Barkley et al., 2005; Fredrickson et al., 2013).

The use of the focus group interview transcripts and the debriefing notes collected from the CIDI course as archival data for this dissertation therefore offers a unique opportunity to analyze what Gee (2004) refers to as *interactional* data collected within the preferred research framework. In this case, the archival data is interactional as students were engrossed in the collaborative learning environment at the time that the original data was collected (Gee, 2004). This offers an alignment between the text-based documents with the actual contextual framework that is the focus of this dissertation: i.e., collaborative learning environments. As the purpose of a critical discourse analysis is to make connection between *languages-in-use-in-society* and the social realities resulting from such exchanges, having the discourse come directly from the context of interest is significant (Gee, 2004, 2008; Rogers, 2004). It implies that in performing the critical discourse analysis on this archival data, the connection between the power dynamics analyzed in the text to the social settings in which the discourse was taken will be facilitated (Gee, 2008; Rogers, 2004). Thus, I contend that the archival data from the CIDI course provides a paradigmatic opportunity to better understand how power manifests in the discourse utilized by undergraduate students working in a collaborative learning environment.

The Next Steps

Chapter four was meant to be complementary to chapter three which outlined the data and data analysis methods for this dissertation. Specifically, chapter four provided a thick description of the contextual framework within which this data was derived to help situate the data and analysis within an explicit social, cultural, and historical context (Gee, 2004, 2008; Rogers, 2004). The purpose for such a description lies in the origins of Gee's (2004, 2008)

approach to *critical discourse analysis* which is aligned with the naturalist and interpretive constructionist research paradigms. As such research paradigms value the multiplicity of perspectives that could influence the interpretation of data and the subsequent analysis of such an interpretation, it is necessary to provide a thick description of not only the data collection methods, the role of the researcher in this collection and the data itself, but also the contextual framework within which this data was derived (Rubin & Rubin, 2012). My efforts in this chapter were therefore to present all of the relevant information pertaining to the development, design, and implementation of the CIDI course as all of these elements impacted the collaborative learning environment in which these students were working.

As part of these efforts, I outlined the following: the postsecondary context which inspired the course; the national calls from engineering and nursing organizations which helped to develop the purpose of the course and garner support for its implementation; the pedagogical framework utilized in the course; the logistics of the course; and the learning theories which inspired the design of the course. This chapter was also an effort to address what Gee (2004) labeled as the *frame problem* as presented in chapter three. I purposefully situated the contextual framework within this larger postsecondary landscape as such initiatives and campaigns influenced the development and learning objectives of the course as well as students' experiences. This influence played a large role in the inspiration for the design of the CIDI course (Sanders & Geist, 2016).

As the stage has now been properly set, I can advance to presenting the completed critical discourse analysis of the archival data derived from the CIDI course in the following chapter. Chapter five will present a two stage critical discourse analysis that first uses Gee's (2004, 2008) Seven Building Tasks to analyze themes derived from a thematic analysis of this archival data

and then connects them to the larger social realities encompassed in the CIDI course via his Theoretical Tools of Inquiry. In doing so, I introduce these broader themes, provide a thick description of the discourse which helped to identify them, and an analysis of how such discourse translates to these students' social realities. This larger analysis will answer the two research questions driving the research objective of this dissertation and will be expanded upon as part of the implications of the final chapter.

CHAPTER 5:

PRESENTING THE FINDINGS OF STAGE ONE AND TWO OF THE CRITICAL DISCOURSE ANALYSIS

Introduction

Several foundational elements for this dissertation have hitherto been outlined in the contents of the previous chapters. Chapter one introduced the motivation and contextual framework for this dissertation and presented this work as a cultural studies project. Primarily a descriptive research project, the aim of this dissertation is to explore archival data which has recorded students' experiences and observations regarding a collaborative learning course to understand how power is constructed and how it influences knowledge construction. *Critical discourse analysis (cda)* was also presented as the conceptual framework and Gee's (2004) approach to *cda* as the analytical framework for this dissertation.²² Chapter two outlined the extant literature representing distinct elements of collaborative learning investigated through various academic perspectives. Chapter three accomplished two objectives: it presented the

²² As noted in chapter one, there are various ways in which to refer to *critical discourse analysis*, each which denotes a specific form, approach, or field regarding this area of scholarship. For this dissertation, I am following Roger's (2004) guidelines for these distinctions and utilizing *critical discourse analysis* to refer to a larger field of theoretical work as it is more inclusive and encompasses Gee's (2004) own understanding of how his work fits into the larger New Literacy Studies movement. When not in italics, critical discourse analysis is referring to the actual analysis. Please see chapter one for more information regarding these distinctions.

archival data from the CIDI course (i.e., focus group transcripts and debriefing notes) and outlined the methodology for this dissertation. As part of this second objective, I introduced how Gee's (2004) approach to *cda* was going to be applied to the archival data for this dissertation, via a two-stage analysis. The first stage employs a thematic analysis of CIDI course archival data tagged with Gee's (2004, 2008) *Seven Building Tasks* while the second stage applies his *Theoretical Tools of Inquiry* to analyze these themes within the larger, societal context represented by the course (Gee, 2004, 2008).

Chapter four focused on the contextual framework in which this archival data is situated. As part of this effort, an in-depth presentation of the CIDI course and several characteristics that make it a unique contextual framework were delineated, including: the postsecondary context; national calls from engineering and nursing organizations which motivated the design and garnered support for its implementation; and the pedagogical framework, logistics, and learning theories on which the course is anchored. Dedicating a chapter to developing the contextual framework of the CIDI course was purposeful as understanding the context within which the archival data was collected is an essential part of conducting a critical discourse analysis (Gee, 2004, 2011; Rogers, 2004). Gee (2004, 2011) contends that an elemental difference of *critical discourse analysis* from traditional language analysis is the connection of the initial language analysis to a rich, deep contextual framework that helps to identify and explore the power dynamics inherent within the discursive exchanges present within that particular context. Providing a thick description of the CIDI course prior to delving into the critical discourse analysis of the archival data therefore outlined the relevant contextual framework for this dissertation by which such critical implications can be derived (Gee, 2004, 2011; Rogers, 2004).

Purpose and Organization

The purpose of chapter five is to present the findings from the critical discourse analysis conducted for this dissertation. These findings, in turn, answer the original research questions that guide this dissertation:

- 1) How does power manifest in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?
- 2) What is the role of power concerning new knowledge construction as reflected in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?

As indicated in chapter three, the archival data utilized in this dissertation originates from one semester of the CIDI course in which fourteen students were placed into four, interdisciplinary teams to create a prototype of innovative technology (Arce et al., 2015; Sanders and Geist, 2016). I am treating this data as discursive, or text-based data that reflects students' experiences and observations from this course as they were discussed in eight focus group interviews or as denoted by students in their thoughts from two debriefing sessions (Gee, 2004, 2011; Riessman, 2008; Rubin & Rubin, 2012). Although this data is not reflective of the larger collaborative interactions developed in the course, it is reflective of the thoughts, feelings, and understandings of these collaborative experiences as expressed by students' responses to the focus group questions and debriefing sessions (Gee, 2004, 2011; Riessman, 2008; Rogers, 2004; Rubin &

Rubin, 2012). The findings presented hereafter are therefore bounded to the discursive exchanges recorded by students and captured in the CIDI course archival data used for this critical discourse analysis (Gee, 2004, 2011; Rogers, 2004).

As previously indicated, the critical discourse analysis conducted for this dissertation was implemented in two, distinct stages. The first stage applied Braun and Clarke's (2006) six-phase model for thematic analysis to archival data tagged with Gee's (2004, 2008) Seven Building Tasks. The purpose of this stage was twofold: to focus on identifying overarching language patterns (i.e., themes) employed by students to express their experiences and observations as recorded in the archival data; and, guided by the tags of Gee's (2004, 2008) Seven Building Tasks, to identify power dynamics endemic within these themes. The second stage of analysis applied Gee's (2004, 2008) Theoretical Tools of Inquiry to these themes. The purpose of this application was to provide an analytical framework by which to describe the language tasks encompassed in these themes and connect such patterns with elements representative of the larger contextual framework of the CIDI course (Gee, 2004, 2008).

The organization of this chapter is reflective of this description and represents two distinct stages of the critical discourse analysis conducted for this dissertation. In the first half, the findings from stage one of the critical discourse analysis are presented. This stage is divided into three steps representing the distinct phases of this part of the analysis. The first step is representative of Braun and Clarke's (2006) familiarization and coding phases; it illustrates how Gee's (2004, 2008) Seven Building Tasks were originally applied to the CIDI course archival data, as well as how this tagged archival data was coded. The second step is representative of Braun and Clarke's (2006) defining, reviewing, refining, and evaluating phases. It presents how the seven broad themes were produced from the original thirty themes initially identified from

the codes resulting from step one in this stage. The third section is representative of Braun and Clarke's (2006) reporting phase wherein an analysis of these themes and their connection to the research questions for this dissertation and Gee's (2004, 2008) Building Tasks is offered. In the second half of this chapter, the findings from the second stage of the critical discourse analysis are presented. This stage applies Gee's (2004, 2008) Theoretical Tools of Inquiry to the seven broad themes identified in stage one. Examples from the descriptions in stage one are integrated into this discussion. Uniform with the organization of the other chapters of this dissertation, this chapter ends with a review of the contents presented and a description of the structure of the final chapter.

Stage One of the Critical Discourse Analysis

According to Gee (2004, 2008), one of seven areas of social reality is impacted whenever a discursive exchange is made. As noted in chapter one, these areas include: the ability to determine *significance*; the ability to carry out socially recognized or culturally supported endeavors (*activities*); the ability to establish a certain identity (*identity*); the ability to build and sustain *relationships*; the ability to apply and distribute social goods (*politics*); the ability to establish *connections* via strategic lingual associations; and the ability to privilege or dismiss certain *sign systems* and *forms of knowledge* (pp. 30-33). Associated with their respective area of social reality, Gee (2004, 2008) purposed the following Seven Building Tasks that can be identified in language patterns: Significance, Identity, Relationships, Politics, Connections, Activities, and Sign Systems Tasks (Gee, 2004, 2008; Rogers, 2004). In stage one of the critical discourse analysis conducted for this dissertation, these Seven Building Tasks guided the analysis of the overarching themes that illustrated students' discursive patterns as recorded in the focus group transcripts and debriefing notes of the CIDI course archival data (Gee, 2004, 2008,

2011). The findings from this stage of the cda are presented as the three major steps representative of this analysis: step one, familiarization and coding, wherein the archival data was tagged with Gee's (2004, 2008) Seven Building Tasks and initial codes were applied to this tagged archival data; step two, defining, refining, reviewing, and evaluating, wherein emerging themes from these codes are presented; and step three, reporting, where these themes are analyzed via Gee's (2004, 2008) Seven Building Tasks and connected to the research questions for this dissertation.

Step One: The Tagging Process and Coding

Step one of stage one of the critical discourse analysis for this dissertation comprised the familiarization and coding phases of Braun and Clarke's (2006) six-phase thematic analysis model.²³ The intention with this section is twofold: to delineate how Gee's (2004, 2008) Seven Building Tasks were applied to the CIDI course archival data (i.e., the tagging process) as part of the familiarization phase and to emphasize the significance of the primary findings from the coding process: *i.e.*, students' association with disciplinary identity markers. Elucidating the application of the Seven Building Tasks to the CIDI course archival data is necessary for connecting this step to the analysis of the resulting themes in step three (i.e., the reporting phase) (Gee, 2004, 2008, 2011). In this step, the focus was thus centered on a thorough language exploration in which the discourse from the CIDI course archival data was read for initial instances of Gee's (2004, 2008) Seven Building Tasks and tagged accordingly. In this reading and rereading of the tagged archival data, it became evident that particular patterns emerged

²³ These phases were thoroughly detailed in chapter three of this dissertation. The intent of this section is to present the findings derived from these phases.

from the text that helped to describe and interpret students' experiences and observations as reflected in the data (i.e., what was significant, from what standpoint, what knowledge was valued, and how they connected this to their own observations) (Gee, 2004, 2008, 2011). These initial patterns resulted in a comprehensive and diverse set of codes that were recorded as nodes within the NVivo software system (QSR International, 2017). The following details the processes and results of these two phases.

The Tagging Process. As part of the familiarization phase of Braun and Clarke's (2006) thematic analysis model, the CIDI course archival data was tagged for instances of Gee's (2004, 2008) Seven Building Tasks. This was completed prior to the coding phase, as I intended to understand the archival data holistically as it encompassed these particular aspects of Gee's (2004, 2008) Theory of Language. The coding process then followed, in which the archival data, already tagged, was read with the intention of underscoring major features of the data that reflect meaningful patterns with regards the objectives of this dissertation (Braun & Clarke, 2006).

In the following, I detail this tagging process as it was completed in the familiarization phase (Braun & Clarke, 2006).²⁴ The following is an excerpt from a nursing student who is reflecting on their first clinical immersion experience in the CIDI course:

[Student, N:] I could see like from (pause) like (pause) it's kind of like if it was vice versa (pause) I mean, this is like a nurse's natural habitat (pause) so if, you know, like,

²⁴ Examples of this tagging process were first introduced in chapter three and illustrated in Table 5 (see Appendix I). This example is meant to provide a more in-depth understanding with regards to this process and the subsequent coding phase of this stage of the analysis.

for me it was like the, the idea of finding something was overwhelming but the experience was enjoyable, because you know I'm learning. It's like, I'm sure if I went anywhere near the engineering building (pause) you guys [engineering students] would be talking to me about stuff and I'd have no clue and I would feel overwhelmed because I would feel like I'm expected to know this stuff, but this isn't my major, this isn't why I'm here, so (pause) but as a, as a group, yeah, it'd be overwhelming but I, I think today uh (pause) I'm sorry if I'm talking a lot, but it, I think today, if anything, um (pause) it was, the guy [device clinic professional] we had today explained a little more (pause) to like you guys [engineering students], but he still talked really like advanced, like I mean (pause) I could understand if they [engineering students] felt overwhelmed because he [device clinic professional] (pause) he did a really good job of like explaining everything, but at the same time he was like still going so fast like instead of putting it in laymen's terms it was, you know (pause) he expected like all of us to know the exact anatomy of the body. So like I said, if it was something with engineering and they were talking that fast about it (pause) I wouldn't have a clue. I'd feel overwhelmed, so

This excerpt not only provides a plethora of detail, but it is also a robust depiction of how students employed Gee's (2004, 2008) Seven Building Tasks in their discursive patterns. For example, in noting that the clinical immersion setting was "like a nurse's natural habitat," this student is establishing a specific role within a distinct, social context: as a nurse (tagged, Identity Task) within a clinical setting (Gee, 2004, 2008). The significance of establishing themselves as a nurse is derived from assumptions that the knowledge (tagged, Sign Systems Task) affiliated with this identity will help them to better navigate the space (tagged, Politics Task) (Gee, 2004,

2008). This is portrayed when this student noted that the device clinic professional, “expected like all of us to know the exact anatomy of the body.”

This statement underscores an assumption of what type of sign systems are valuable in the clinical immersion context: arguably, those associated with the knowledge acquired from someone associated with a nursing identity (Gee, 2004, 2008). The politics of this distribution of goods is established in the comparisons this student makes to indicate when and where sign systems or forms of knowledge associated with an engineering identity would be considered significant. For instance, this student notes:

[Student, N:] It’s like, I’m sure if I went anywhere near the engineering building (pause) you guys [engineering students] would be talking to me about stuff and I’d have no clue and I would feel overwhelmed because I would feel like I’m expected to know this stuff, but this isn’t my major, this isn’t why I’m here, so

This student reiterates this point towards the end of their reflection, mentioning:

[Student, N:] So like I said, if it was something with engineering and they [engineering students] were talking that fast about it (pause) I wouldn’t have a clue. I’d feel overwhelmed, so.

Had the immersion setting been in a place aligned with an engineering identity, this student acknowledges that the knowledge (i.e., sign systems) acquired from being affiliated with an engineering marker (i.e., identity) would provide a clear advantage (i.e., politics) (Gee, 2004,

2008). The tagging process of the archival data embodied this type of critical reading of the text to identify and tag language indicative of Gee's (2004, 2008) Seven Building Tasks. These were marked in the archival data as a separate set of nodes within the NVivo software system (QSR International, 2017).

The Dominant Pattern. After the familiarization stage and tagging process were completed, I entered into the coding phase of Braun and Clarke's (2006) thematic analysis model. As noted in chapter three, this phase comprised a rereading and evaluation of the tagged, archival data with the purpose being to underscore features of the text that represented meaningful patterns (Braun & Clarke, 2006). In this process, a separate set of nodes representing an in vivo coding process were created within the NVivo software system (Braun & Clarke, 2006; Rubin & Rubin, 2012; Saldaña, 2009; QSR International, 2017). These codes noted significant aspects that arose from reading the various items that comprise the archival data that were relevant to the CIDI course (Braun & Clarke, 2006). These include a wide array of codes that capture several elements including, for example: students' feelings (e.g., anxious, nervous, unsure, uneasy, fearful, excited, overwhelmed), communication patterns (e.g., easy to talk with nurses, difficult to talk with nurses, no opportunity to talk with nurses), and challenges (e.g., discomfort, could not understand, new language, different space, foreign). Table 6 illustrates a partial list of the codes that emerged in this stage (see Appendix J).

What became significant in this coding process was the predominance of codes that encompassed Identity Tasks specific to a disciplinary marker and the alignment of other Building Tasks to this identity marker (Gee, 2004, 2011). That is, codes that reflected different aspects of the CIDI course (e.g., communication, feelings, experience), often encompassed an Identity Task that was associated with the student's discipline (Gee, 2004, 2008). For instance, the code

Excitement contained several examples of nursing students reflecting on their perceived excitement working in the clinical immersion settings. In these examples, nurses tended to indicate that they felt that they were at an advantage (i.e., Politics Task) as they could more readily navigate a space (i.e., Connections, Activities, Sign Systems Tasks) that seemingly aligned to their disciplinary identity marker (i.e., a nurse, Identity Task) (Gee, 2004, 2011). In the same code, examples of engineering students' reflections of their experience in the design process tended to indicate that they felt advantageously positioned (i.e., Politics Task) as they interpreted their disciplinary identity marker (i.e., engineering, Identity Task) to be more relevant in this setting (i.e., Connections, Activities, and Sign Systems Tasks) (Gee, 2004, 2008, 2011). The dominance of an Identity Task related to discipline was noted in this stage for its prevalence among not only the derived codes but also throughout the tagged, archival data (Braun & Clarke, 2006; Gee, 2004, 2008).

Step Two: The Presentation of Themes

In the second step of the first stage of the cda, the codes that resulted from reading and rereading the tagged, CIDI course, archival data during the coding phase were analyzed for more refined, overarching patterns (Braun & Clarke, 2006). For the purpose of identifying these patterns, Braun and Clarke's (2006) defining, reviewing, refining, and evaluating phases for thematic analysis were employed. Engaging in Braun and Clarke's (2006) defining phase, the initial codes that resulted from the coding phase were holistically analyzed to underscore commonalities, patterns, and relevance to produce candidate themes (Braun & Clarke, 2006).

This process resulted in the thirty themes represented in column 1, Table 7 (see Appendix K) (Braun & Clarke, 2006; Gee, 2004, 2008).²⁵

Upon further review, these candidate themes were refined into more specified categories that helped to describe the patterns associated with the Building Tasks being utilized by students to describe their experiences and observations in different phases of the CIDI course (Braun & Clarke, 2006; Gee, 2004, 2011). The refined themes reflect a more nuanced understanding of the contextual markers indicated by the initial codes and different combination of the Building Tasks in these students' descriptions. These activities are representative of Braun and Clarke's (2006) reviewing and refining phase. In total, seventeen themes resulted from this phase; these are listed in Table 7, column 2 (see Appendix K). These themes provided the thematic map that anchored the evaluation phase of this process (Braun & Clarke, 2006).

As part of the evaluation phase, the themes comprising this thematic map were then further refined, reviewed, and finally evaluated by noting any connections between them or any potential sub-themes that could help explicate the intricate of the overarching patterns (Braun & Clarke, 2006; Gee, 2004, 2008). This led to a further refinement of the themes and the identification of overarching features in the data (Braun & Clarke, 2006). Seven final themes resulted from this process: *Ability to Contribute*, *Design Expertise*, *Engagement*, *Expectations*, *Positioning*, *Leadership*, and *Team Dynamics*. These themes encompass sixteen sub-themes including: *Dependence*, *Feeling Overwhelmed* (Ability to Contribute); *Listening and Observing*, *Talking and Interacting*, *Exploration* (Engagement); *Aligned*, *Unaligned*, *Newness*

²⁵ A description of Braun and Clarke's (2006) conceptualization of candidate themes, thematic maps, and final themes are integrated as part of data analysis methods in chapter three.

(Expectations); *Problem Solving, Problem Identification* (Design Expertise); *Insider, Outsider* (Positioning); *Attitude, Teaching* (Leadership); and *Understanding, Confidence* (Team Dynamics). These final themes are indicated in column 3 of Table 7 (see Appendix K).

Throughout these phases of the thematic analysis process, triangulation methods (via consultation of the reflective journal and observations) and member checking (via consultation of the faculty members familiar with the CIDI course and the archival data) were employed (Rubin & Rubin, 2012). In particular, my creation of the candidate themes was derived from a holistic reading of the codes that were generated during the coding phase of the process (Braun & Clarke, 2006). In analyzing how the initial codes could be defined, and the subsequent candidate themes and thematic map reviewed, refined, and evaluated, I had to understand the context in which these students were referring to in their reflections (Braun & Clarke, 2006). I thus paired these phases with readings of the reflective journal I kept during the data collection process and the observations I made throughout the course of the semester in which this data was collected (Braun & Clarke, 2006; Rubin & Rubin, 2012). These external resources helped to underscore what features of the data were significant, meaningful, and relevant to the research questions for this dissertation (Corbin & Strauss, 2008; Rubin & Rubin, 2012).

Moreover, two member checking sessions with the faculty members of the CIDI course were held during the course of this process: one after the thematic map was created, the other after the final themes were defined (Rubin & Rubin, 2012). These sessions consisted of a thorough discussion of the process by which these themes were derived, connections made between their own observations and the patterns captured by these themes, as well as their own understanding of the relevance of these themes to the context of the course (Rubin & Rubin, 2012). These steps were taken to ensure the trustworthiness of these final themes and their

relevance in addressing the research questions for this dissertation (Braun & Clarke, 2006; Rubin & Rubin, 2012). The NVivo software system was utilized during this step of stage one to manage, combine, coordinate, and generate the themes that emerged from engaging in each phase of the process (Braun & Clarke, 2006; Rubin & Rubin, 2012; QSR International, 2017).

Step Three: A Discussion of the Findings for Stage One

The objective of this dissertation was to explore how power manifests in interdisciplinary exchanges and how it influences knowledge construction as reflected in the discursive practices recorded in the CIDI course archival data. This section offers a preliminary discussion of the major thematic elements found from the first stage of the critical discourse analysis conducted for this dissertation as they relate to this objective. This analysis is representative of Braun and Clarke's (2006) reporting phase and it intentionally reintroduces Gee's (2004, 2008) Seven Building Tasks as the central feature of the analysis in this phase. In general, power manifested in the alignment of students' disciplinary markers to relevant knowledge, language, or contextual relationships represented within a space that provided them certain leverage over their counterparts (Brissett & Mitter, 2017; Lim, 2014). This alignment subsequently influenced students' perceived ability to interact with distinct social contexts as well as with one another for the purpose of knowledge construction (Lim, 201; Literat, 2016).

In an effort to provide a more comprehensive discussion of these dynamics, an overarching description of each theme as well as examples from the data that illustrate the sub-themes that comprise the larger pattern are provided (Gee, 2004, 2011; Rogers, 2004; Rubin & Rubin, 2012). When possible, the students' own discursive practices are privileged throughout this presentation; however, some of the language may be rephrased to help readers understand the dialogue or to protect student's identities as they speak to one another. Some of the

rephrasing techniques also include the removal of outside interjections (i.e., “yeah”, “um hm”, etc.). Student’s natural pauses, however, remain as part of the presentation as they form unique discursive patterns in the text; this is relevant as the pauses are indicate of students’ thinking processes (Braun & Clarke, 2006).²⁶ When applicable, contextual markers are also provided throughout these descriptions (i.e., what students are referring to if it is unclear) (Braun & Clarke, 2006).

Positioning. This theme is categorized by language patterns that privilege a combination of four prevalent Building Tasks - Identity, Politics, Sign Systems, and Relationship Tasks (Gee, 2004, 2008). Through these language combinations, students describe their perception of an experience in the CIDI course as understood from a specific disciplinary marker (i.e., either a nursing perspective or an engineering perspective) denoting an Identity Task (Gee, 2004, 2008). This disciplinary marker, in turn, awards students certain advantages or disadvantages (Politics Task) within specific settings associated with the CIDI course (i.e., either the clinical immersion or the design phase) (Gee, 2004, 2008). These advantages are typically aligned with advanced

²⁶ According to Braun and Clarke (2006), albeit there is no definitive way to present data excerpts, “...at a minimum it requires a rigorous and thorough ‘orthographic’ transcript – a ‘verbatim’ account of all verbal (and sometimes nonverbal [e.g., coughs]) utterances” (p. 17). The original archival data detailed a verbatim account of all verbal and nonverbal utterances as described in the statement above; the minimal revisions indicated are completed to help ease the reader’s understanding of the text (Braun & Clarke, 2006). However, I reiterate that student’s natural pauses remain as I believe these are relevant to understanding their thinking processes in developing their reflections.

knowledge, more experience, or simply more familiarity with (and therefore less anxiety of) a specific setting all of which denote a level of fluency regarding a particular sign system (Sign System Task) (Gee, 2004, 2008). These advantages, in turn, are indicative of how students perceived themselves regarding a specific context as well as in relation to their peers (Relationship Task) (Gee, 2004, 2008). As part of this overall theme, student discourse tended to fluctuate between: identifying as someone functioning outside of the perceived appropriate disciplinary marker for a specific setting (sub-theme Outsider) or someone aligned with the appropriate disciplinary marker for that setting (sub-theme Insider).

Outsider. For engineering students, the sub-theme of Outsider tended to be prevalent during the clinical immersion phase where their academic background and knowledge was considered less aligned with the setting than that of their nursing peers. A majority of engineering students incorporated this type of language in reflecting on their experiences in the first few clinical immersions. To illustrate this point, one engineering student described their third clinical immersion as follows:

[Student, E:] I think that my prior or uh (pause) what I've learned so far will (pause) start to come more in hand now in, in the design process and knowing all of those different things that I have to take into account (pause) one of the things we're looking at is uh (pause) drawing up (pause) medication without uh, looking into, like [nursing student is] saying, just using pressure and stuff like that and, and my mind is thinking that way like, "Oh well, we need to do *this* part of it," so (pause) I think my prior, or what I've already learned, will (pause) start to come more into play for the design aspect of it

In contrast, nursing students were inclined to express more language aligned to the *Outsider* sub-theme upon entering into the design phase of the CIDI course. For example, two nursing students spoke about their anxiety regarding the alignment of their nursing background to the expectations associated with the design phase of the course:

[Student, N1:] Maybe I, I, I could possibly find a problem and, well, I guess my biggest fear was like not (pause) thinking that I wouldn't be able to or wouldn't be able to come up with a solution to fix

[Researcher:] Um hm

[Student, N2:] So I was really really *really* hoping that we have a good engineer in our group (laughter) I really was! (pause) Because, or for me, *an* engineer that was in our group, um, so that, you know we, would be able to solve a problem that wasn't, I mean, I know this was a team effort, but you know, we kind of crutch on our engineer (pause) At least for me

[Student, N1:] Oh yeah me too (laughs)

[Student, N2:] I do, because I just (pause) because I don't have that background and it (pause) it's like we can have this a vivid imagination, but is it you know realistic?

Insider. For the majority of nursing students, the language that they utilized to describe their experiences in the clinical immersion settings reflected a familiarity and alignment with their disciplinary marker in the nursing profession. A nursing student reflects this social reality in the following description of their experience in the first clinical immersion:

[Student, N:] And I mean (pause) it's kind of like (pause) I've got the comfort now of where I've worked in the hospital, I can walk into a patient's room and say, "Hey! Good afternoon, my name is [student's name]," or whatever, whereas (pause) the engineers are kind of like, "Well, I think I'm just kind of like, going to uh, stay right here....,"

[Student, E:] Hm (laughs)

[Student, N:] "...I don't want, I don't want to say anything. I don't know *what* to say," where (pause) they've [the engineering students] never experienced that interaction because they don't, they've never had to care for that patient (pause) and so (pause) and knowing like (pause) like how to handle yourself within the room, like knowing (pause) like I feel a lot of times the engineers will come in with their, I mean they're *looking* at stuff, but they don't want to touch it cause they're like, they don't wanna, "Oh, I don't wanna mess this up," (pause) "I don't know what it does," so uh (pause) just kind of that, that prior knowledge has kind of help, helps me in that situation

Engineering students, on the other hand, tended to indicate an alignment of their disciplinary marker with the design phase of the course. Familiarity with the equipment, knowledge content, and the modeling software utilized for the design phase were often integrated as part of the Sign System Tasks utilized by engineers to describe their experiences in the design phase of the CIDI course.

Expectations. This theme is categorized by patterns in student language that utilized a combination of three prevalent Building Tasks – Significance, Connections, and Identity Tasks (Gee, 2004, 2008). Through these language combinations, students tended to describe their perception of what they expected or anticipated from a particular experience in the CIDI course (Significance Task), founded on preconceived notions of what they believed to be a central

component of that particular setting or activity (Connections Task) (Gee, 2004, 2008). In relating these expectations, students integrated language that indicated that these preconceived notions were derived from their own understanding originating from a specific disciplinary marker (i.e., either a nursing perspective or an engineering perspective) denoting an Identity Task (Gee, 2004, 2008). As part of this overall theme, student discourse tended to fluctuate between the following scenarios: expressing that an experience or activity was similar or fairly close to what they initially anticipated (sub-theme Aligned) or expressing that an experience or activity was not very similar or fairly different to what they had anticipated (sub-theme Unaligned). In other instances, students reflected on experiences and activities that were out of their range of possible pre-conceived notions either from what they anticipated or how they understood the setting from their disciplinary markers. These instances were denoted as the sub-theme Newness.

Aligned. Several of the instances that illustrated the patterns associated with the sub-theme Aligned are reflective of elements connected to students' positioning as an Insider or Outsider to a specific setting. In most cases the instances of the sub-theme Aligned reflect expectations associated with the students' positioning via their disciplinary marker (i.e., nursing student or engineering student). Nursing students tended to express an alignment of their expectations to the clinical immersion setting; what they found to be significant in the clinical immersion experience was in line with what they expected or anticipated to be highlighted in such experiences. For most nurses, this included instances where they were afforded the opportunity to interact with patients, interact with a familiar environment, or observe certain spaces usually off-limits to students. The following exchanges between two nursing students

show this type of alignment with their expectations regarding the significance of interacting with different aspects of the clinical immersion environment:

[Student, N2:] Like because whenever I started as a CNA um (pause) they weren't pumps (pause) It was, you did it by gravity (huh) Yeah, and the higher you hung the bag, the lower you hung the bag you know, and now the pump does it for you (pause) and so it's like, "Cool!" (laughs)

[Student, N1:] Yeah and we talked about a machine today that goes into the left ventricle and helps with the ejection rate, uh the uh ejection rate, and it (pause) It literally does almost all the work the left ventricle needs, so it

[Student, N2:] The P-lev or whatever? (pause)

[Student, N1:] Yeah, and it (pause) it's just fascinating (pause) I mean, sometimes you get so caught up in what you do almost every day that you never really sit back and appreciate

[Researcher:] Um hm, yeah, yeah

[Student, N1:] Like

[Researcher:] How amazing it is?

[Student, N1:] How commonplace it is, yeah

[Student, N2:] Poor nurses, I was standing over one of the them as they were getting blood out of one of the lines (pause) just completely nerved out because (pause) it was so cool (pause) they did not prick the patient, got to give the blood back, it wasn't like you were wasting blood and I'm just like, "Aw! That's so cool!" (pause) and she was like

very patient, and she was excited that I was excited and (pause) Oy! At least I know I'm in the right profession, huh? (laughs)

In contrast, engineering students tended to express more of an alignment of their experiences in the design phase of the course to their expectations of what would be significant in that setting: that is, what they found to be valuable opportunities in the design phase of the course were in line with what they expected or anticipated to be highlighted in such experiences. This included exposure to the MakerSpace, experience with the 3D printing equipment, and more practice with design software (e.g., SolidWorks). Moreover, in the archival data both engineering and nursing students were noted acknowledging a preconceived understanding of what settings were going to be aligned more to their expectations (i.e., clinical immersion to nursing and design to engineering). For example, this engineering student indicated the following observation when asked about technical authority within the group:

[Student, E]: with [the nursing student in my group] (pause) I was like, "I don't know what that does and I don't know where that's going but (laughter) if you could let me know that'd be cool" (pause) uh (laughs) and so yeah, both aspects like (pause) I wouldn't say that anybody held *more* [technical authority] but I would say in certain fields (pause) there's definitely a bit like the clinical thing and nursing and there's just been we've all brought *something* to the table that's been different and the uh, the coll, collaboration of that has been, was what has implemented this design

Unaligned. At the same time, when students described certain experiences within the clinical immersion or design phases of the CIDI course, there were also expressions of a misalignment between what they were expecting and what they experienced or observed. Instances of the sub-theme Unaligned reflect expectations associated with the students' understanding of their colleague's disciplinary markers from the vantage point of their own disciplinary marker (i.e., nursing student or engineering student). The majority of these instances were expressed by nursing students with regard to their expectations of the design phase of the CIDI course. Unfamiliar with the design process, the following nursing students expressed a misalignment between how they expected the design process to manifest versus their own experiences with their group throughout the course:

[Student, N:] I wa, I was (pause) I mean, I thought it was pretty cool. I thought it was (pause) like, like I wa, was looking at it as like, "Alright, we're gonna design something and make millions!" you know? (laughter) Like get rich before you're 30, so uh (laughs) that's, that's the goal in life, um (pause) no, but, I mean you come in and you're like (pause) "Well, everything's working good so (pause) wha, what needs to be fixed?" so (pause) it's hard to find something that uh (pause) needs to be changed or *how* to even change it, so (pause) it's just, I don't know, it's just you, you come in, each week, and you just kind of have a different mindset (pause) of well uh, "This didn't work last week so maybe I'll come in and try something else," so (pause) it's kind of like a trial and error thing uh

Newness. In other instances, students described their experiences or observations within the CIDI course as completely unexpected. Instances of the sub-theme Newness represent students' descriptions of unforeseen or unanticipated experiences throughout the course. Examples of language patterns associated with the Newness sub-theme indicate that such experiences were neither aligned nor unaligned with their pre-conceived notions or expectations, but rather completely outside of their initial understanding from the vantage point of their disciplinary markers. For nursing students, this type of unexpected experience was related to the integration of design elements into the clinical immersion space (e.g., viewing a familiar setting in a new, or different way). For engineering students, this type of unexpected experience was associated with interacting with the clinical immersion settings as a foreign or unfamiliar space. In the following excerpt, an engineering student even incorporated the word "newness" to express how they understood their clinical immersion experiences:

[Student, E:] Oh I was excited, um (pause) usually you don't have a whole lot of medical examples or anything like that so just (pause) getting to see the medical side of it and stuff is uh (pause) just completely different in that it's a new, I ju, I just like the newness of it (pause) being submerged in it. I was a little nervous, cause I'm not good with hospitals, I don't have the stomach for it or anything like that, so it's probably not the best thing that I took this class (laughter) but it's been really eye-opening at the same, so

Another engineering student after the second clinical immersion setting expressed a similar sense of unexpectedness from the experience:

[Student, E:] Yeah I guess I was nervous just because it was an unknown (pause) I don't, you know, like pass out (pause) from blood and needles or anything like that but uh (pause) just excited for like, you know, it's just like [other engineering student] was saying, you're very narrow minded, so it's just a very different setting from what we're [both engineering students] used to in our classes

It is also interesting to note that both engineering students in these examples also indicated a level of nervousness with regards to the clinical immersion environment. This nervousness can be interpreted as linked to an initial preconceived expectation of an alignment (i.e., hospitals make me nervous) or misalignment (i.e., the unknown makes me nervous) that was not necessarily realized as part of their experience as denoted by their responses.

Ability to Contribute. This theme is categorized by patterns in student language that utilized a combination of four prevalent Building Tasks – Identity, Significance, Politics, and Sign Systems Tasks (Gee, 2004, 2008). Through these language combinations, students indicated the value of specific types of knowledge or academic background valuable to a certain setting (Sign Systems Task) and then determined whether their specified disciplinary marker (Identity Task) allotted them the necessary tools (Politics Task) to make a valuable contribution in that space (Significance Task) (Gee, 2004, 2008). As part of this overall theme, student discourse tended to fluctuate between two main scenarios. One was centered around expressing a sense of reliance on other group members whose disciplinary markers allowed them more versatility or familiarity within a specific setting (sub-theme Dependence). The other illustrated a sense of limitation based on being inundated by several elements including a barrage of unfamiliar languages, experiences, and settings (sub-theme Overwhelmed). Both derived from

an initial understanding of their direct environments and experiences as originating from disciplinary markers (i.e., a nursing perspective or an engineering perspective).

Dependence. The sub-themes for the broader theme Ability to Contribute are associated with student expressions that indicate an understanding of value or significance placed on specific sign systems within a determined setting. For engineering students, the majority tended to acknowledge that the disciplinary marker associated with nursing was more valuable within the clinical immersion setting, rendering them reliant on their nursing counterparts to understand, let alone navigate, this unfamiliar environment. Wherein the sub-themes associated with Expectations indicated that such an alignment made sense, expressions associated with Dependence moved the argument further to indicate an inability to contribute due to a reliance on specific members of their group. For example, the following exchange between an engineering and nursing student regarding the former's feelings during the clinical immersion experiences indicated a sense of reliance on their nursing peers:

[Student, E:] I thought there was a learning curve, um (pause) for the first couple of weeks

[Researcher:] Um hm

[Student, E:] Um (pause) for, for me uh definitely uh just (pause) you know, going into a, a, a setting where you've been, you know, there with a family member or seeing a friend, but you've never been on the other side where you're, um (pause) you know, asking about things, you know, "What's this?" or someone says something and you have no idea what they're talking about, so there's that initial learning curve, um (pause) of uh all, all

the a medical (pause) medical lingo, that, I didn't even know what an NG tube stood for, you know, before the semester, so

For nursing students, the situation was switched when the groups entered into the design phase of the CIDI course. Here, they were more reliant on their engineering counterparts to help them understand and navigate unfamiliar terrain. The following exchange between an engineering student and a nursing student reflecting on the design phase of the course depicts this type of reliance:

[Student, E:] I mean, the first thing I thought was uh (pause) when we were trying to figure out (pause) like what our design would look like (pause) like a lot of the time it was like, “Well (pause) this is how it should be,” and like, we’re like really visualizing it (pause) and then like (pause) some of the nursing majors not like (laughs) getting what we're talking about

[Researcher:] Oh yeah

[Student, E:] And we’re like (pause) we’re like, “Well, it’s (pause) (laughs) it’s kind of like this,”

[Researcher:] Yeah

[Student, E:] Like, like that, that came up a lot in the uh (pause) one where we were in the Makerspace and made the uh (pause) whatever the uh one prototype was?

[Researcher:] Oh (pause) yes, yes

[Student, E:] We had a lot of trouble with that

[Researcher:] Yes

[Student, E:] And we (pause) that's why we took the longest (laughs)

[Student, N:] Yeah (laughs) yeah and I (pause) I think finally there were points where we were like, “Here! Just do it!” (laughs) “Ok (pause) no, no, no, now, now, you! Here! Just do it!” (laughs)

Overwhelmed. Similar to the sub-theme of Dependence, within the sub-theme Overwhelmed students expressed an understanding of value or significance placed on specific sign systems within a determined setting. However, instead of becoming reliant on the colleagues within their group that understood the relevant sign systems to navigate a specific environment, students expressed a feeling of being subdued by the degree or intensity by which they were interacting with certain facets of the CIDI course. For engineering students, this type of expression was prominent during the clinical immersion experiences where they could not retain a significant level of understanding, even with the help of their peers, to make contributions within that setting. In these scenarios, engineering students tended to express a desire to “get of out of their shell,” “try to ask more questions,” or do more background research to be prepared for the next immersion experience. For nursing students who expressed this sentiment, the sense of feeling overwhelmed stemmed from their attempts to integrate design aspects into the clinical setting. The following exchange between two nursing students which incorporated the word *overwhelmed* twice to describe a clinical immersion experience illustrates this point:

[Student, N1:] Definitely, probably overwhelming also were all the ideas that were thrown at us when we were in the ER, because (pause) our first day we didn't get as many ideas (pause) it was just kind of (pause) seeing what the hospital, or what the ICU was

(pause) I had never been in the ICU before (pause) but then, when we get into the ER, they were, there were probably thirty, third, at least thirty things thrown at us, or it felt like thirty things (pause) maybe less, but

[Student, N2:] Or more! (laughs)

[Student, N1:] Yeah! Or maybe more! I don't even know, I lost track (pause) but it was (pause) a little bit overwhelming (pause) just with all the things they were like, "Oh! We need this! We need that! Ya'll could improve this! And this!" And so, just all the things that, you don't even think about until you ask someone who's been in health care for years

For these nursing students, the incidents in which they felt inundated involved the deluge of design ideas that were being offered by the nursing and professional staff within the clinical immersion. This sentiment was echoed by numerous nursing students in the debriefing notes as well. In other instances, the inability to communicate with their engineering colleagues proved to be an overwhelming experience for nursing students. Several nursing students expressed a desire to be able to contribute to their design project, but indicated frustration by the disjunction between the different sign systems being used by the two disciplinary markers in the conversation (Gee, 2004, 2008). For example, one nursing student expressed this type of frustration when describing their experience in the design phase of the course:

[Student, N:] Because you get aggravated when you're *trying* to go from point A to point B (pause) but it's not a straight line, but you think it should be a straight line and it can get *really* irritating (pause) so, I think

Engagement. This theme is categorized by student language patterns that utilized a combination of four prevalent Building Tasks – Identity, Activity, Politics, and Sign Systems Tasks (Gee, 2004, 2008). Through these language combinations, students indicated that within the lens of their disciplinary markers (Identity Task) there was a familiarity with specific types of knowledge or academic background valuable to a certain setting (Sign Systems Task) that then allowed them to navigate those settings at a different level than their counterparts (Politics Task) which, in turn, lead to different types of actions by the group members in that space (Activities Task) (Gee, 2004, 2008). Unlike Ability to Contribute, this theme focused on the actual contributions (i.e., activities) made by students in different settings as expressed by their reflections of certain experiences or observations (Gee, 2004, 2008). As part of this overall theme, student discourse fluctuated between two types of contributions to the group. One was centered on an association with disciplinary markers that allowed them a higher degree of interaction with a particular setting through either talking to various professionals representative of that environment or engaging directly with the environment on their own (sub-theme Talking and Interacting). The other one emphasized an association with disciplinary markers that limited their interaction with a particular setting, wherein their activities were described as either listening or observing (sub-theme Listening and Observing). A third sub-theme of Engagement was added to reflect student expressions that were unassociated with their group activities or design processes within the CIDI course but rather illustrated a genuine curiosity reflective of individual interest (sub-theme Exploration).

Talking and Interacting. The sub-themes under Engagement reflect student expressions of differing degrees of action within specific settings in the CIDI course. The first of these encompasses two forms of action that comprise the sub-theme Talking and Interacting: talking

with representatives of the setting being described and interacting with various resources within that setting. For nursing students, much of the interaction described in the clinical immersion setting highlighted their ability to talk with fellow nurses, doctors, and patients present within that setting. One nursing student reflected on this type of interaction with the nursing staff in their second clinical immersion experience:

[Student, N]: Also, in clinical settings I've been asking nurses and stuff (pause) like well, "What, what would you think of this idea?" And (pause) a lot of nurses are like, "Well I've never really thought of that," like but "that's an awesome idea" because (pause) I mean uh my first question (pause) to most of them are, "How many do you know that's been stuck by a needle?" and uh almost every nurse I've asked so far have known someone who's been stuck so if you can cut down on that then (pause) this is a solution. (pause) And, it's just, I uh (laughter)

Nursing students also reflected on experiences in which they were actively interacting with the equipment available in the environment (when possible) and instances where they felt they were demonstrating to their engineering peers proper patient care techniques (e.g., adjusting a tube for a patient when requested).

This dynamic changed to favor engineering students when the course shifted to the design phase. Within this environment, engineering students expressed more activities related to interacting with the professionals of the MakerSpace, software experts, or the professors of the course. They also reflected on their frequent interactions with resources in this space (e.g., the 3D printer, design software) and instances where they felt were demonstrating design expertise

to their nursing peers. An engineering student described this type of interaction in the MakerSpace when reflecting on one of their team's design sessions:

[Student, E:] Well (pause) yeah it was like, it was pretty big, cause (pause) Um, I've actually had to ask uh one of the professors to sit down with me and say, "Okay this is what we're trying to do (pause) do you have any ideas?" Cause (pause) I mean, when you look at most devices that are like ours (pause) you just, you just plug it into another plug and that plugs already a part of the system but ours is, "Okay this is not a part of the system, we're intro- (pause) basically we're introducing this plug into it" (pause) so any plug, or any cord can go into this, this thing (pause) so yeah (laughter) We just had to come up with the idea like, "okay this is going to be (pause) it *has* to be different than everything else, it's going to be (pause) it's going to have to be *this* thing" instead

Listening and Observing. In the instances where the disciplinary markers seemed unaligned to the setting in which the students were interacting, the actions expressed by the students' reflections on their experiences were more passive in nature. For such occurrences where students perceived their disciplinary markers did not purvey them with the ability to understand the sign systems necessary to interact with the respective professionals or resources, students instead indicated that they either listened to their peers to learn more or observed their environment to get a better grasp of the setting (Gee, 2004, 2008). These two types of actions categorize the sub-theme of Listening and Observing. For the majority of engineering students, these types of activities marked their reflections regarding the experiences they had in the

clinical immersion setting. One nursing student even commented on this type of dynamic in their second clinical immersion:

[Student, N:] You know, none of these guys [the engineering students] would talk to the patients! (laughs)

However, like most of the dichotomies represented in the CIDI course environment, the situation was reversed once they entered into the design phase. In this setting, the nursing students took a step back from the high level of interaction they had in the clinical environment as they observed their engineering peers more readily navigate the design space. One nursing student reflecting on the degree to which they sensed that they were simply listening and observing their engineering peers in the MakerSpace portrays this tendency:

[Student, N:] I do kind of wish that (pause) (laughs) I know, again, time was another issue, but like to have some type of tutorial on SolidWorks so like we *possibly* could have helped [the engineering student] in some way because, um (pause) I feel like [engineering student] did um, not a majority, [engineering student] did *all* the work designing, cause um (pause) like the best thing we [nursing students] could do is say, “Oh yeah, that looks good!” (laughs) (pause) um or make like a small suggestion like see if [engineering student] could do this or that but um (pause) but, yeah, again, that just would have been really *difficult* probably (pause) to do, like, in class, but (pause) yeah, um (pause)

Exploration. This sub-theme represented an interesting dynamic expressed by both engineering and nursing students that was indicated as a direct connection to being in the CIDI course. The sub-theme of Exploration indicates times where students of either disciplinary marker manifested their curiosity for a topic or element related to the CIDI course that led them down a path of exploration. For both nursing and engineering students, this type of exploration was typically linked to further research of some kind associated with a specific topic or a unique interest that was initially driven by their experiences or observations in either the clinical immersions or design setting of the CIDI course. In one excerpt, a nursing student describes how an interest in learning about needle production and the amount of waste produced within the United States from this industry led them to spend extra time outside of the class researching this topic. In another example, an engineering student described a similar incident where they were led down another research path of exploration:

[Student, E]: What else I like about it too is that it opens up other areas of interest that maybe I, I wouldn't have thought that I'd be interested in before like (pause) [nursing student has] gotten more than one text where I've been like, "Guess what I found out medically today?" (laughter) Like, "I found out that this girl's in the hospital for that, and that, because that happened" (laughter) And I'd randomly come up with like

[Student, N]: [Engineering student would] text me in the middle of the day, "Do you know what a hydatidiform molar pregnancy is?" (pause) And I was like, "Yes! How, what does this have to do with?"

[Student, E]: 'cause I was looking at high molar density and that came up in google and I was like, "Oh! I wanna know what that is!"

[Student, N]: Yeah that was my first question like, "Where?..."

[Student, E]: I did some research!

Design Expertise. The Design Expertise theme is categorized by patterns in student language that utilized a combination of four prevalent Building Tasks – Sign Systems, Significance, Connections, and Activities Tasks (Gee, 2004, 2008). Within this theme, student discourse in the archival data denoted a specific type of knowledge or background associated with the design process (Sign Systems Task) which often included allusions to ideation, brainstorming activities, problem identification, or problem solving functions associated with the development of their prototype of innovative technology (Arce et al., 2015; Gee, 2004, 2008). In these reflections, students would highlight the value associated with an aspect of the design process that they deemed relevant or necessary for their project to progress (Significance Task) (Gee, 2004, 2008). These comments would often infer a link to other forms of knowledge, background, contributions, or experiences (Connections Task) that they thought helped them to better contribute to this aspect of the design process (Activities Task) (Gee, 2004, 2008).

As part of this overall theme, student discourse tended to fluctuate between two main types of design expertise processes that became sub-themes for this group: problem identification and problem solving. In the Problem Identification sub-theme, student reflections would relay their experiences related to the first step of their design process (i.e., identifying a challenge) including descriptions of valuable realizations that helped them to be able to contribute to this important activity (Arce et al., 2015; Sanders & Geist, 2016). In the Problem Solving sub-theme, student reflections were centered on product development, improvement, or prototyping modifications and the resources or understandings necessary to implement such changes to their project (Arce et al., 2015; Sanders & Geist, 2016). Although students did, at times, allude to an

identity task via a disciplinary marker (e.g., design thinking is associated with an engineering disciplinary marker) in most instances such an indication did not also dictate their understanding of their ability to interact with the design process they were describing (e.g., I cannot contribute because I am not an engineer) as it would with instances highlighted in the Ability to Contribute theme.

Problem Identification (Ideas). As outlined in chapter four, the CIDI course was created to align with specific design objectives associated with the development of a prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). For the clinical immersion experiences, student teams were asked to interact with this environment with a specific design component in mind: the identification of a potential healthcare challenge that could lead to the development of a prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). In reflecting on this task, students often described their experiences as part of their clinical immersions. For example, engineering students tended to indicate that to identify a potential challenge they would observe the clinical surroundings and attempt to make inferences of possible healthcare issues based on their observations or discussions with their nursing peers. Several examples of problem identification produced by engineering students focused on potential ideas related to the devices or technological equipment observed within the settings.

For the nursing students, their reflection on this topic elucidates that problem identification, in general, was quite new for them as part of the design process. When integrated into the reflection, nursing students tended to associate problem identification more with patient care than with the devices or technological equipment observed in the various clinical settings. The majority of nursing students indicated that problem identification was initially arduous because as they were already ingrained in the clinical environment it was difficult to engage with

a familiar setting with a design centered mindset. One nursing student described this transition as follows:

[Student, N:] Well for me (laughs) um (pause) it's, it's been, it's uh been a good experience um (pause) you know all I see is nursing side of things and I've never went into a clinical to think um (pause) how can I better this, you know? I've never considered the engineering side of, of it (um hm) because, you know, I don't have an engineering background, so I kind of stayed away from (pause) I mean not really that I stayed away from thinking it, but I never (pause) thought about thinking it, if that make sense, um so (pause) now that I go into clinical, anytime that I'm in clinical, whether it's with this class or with my classes, I tend to like want to go around (laughs) and like look at different things (laughs) and, I have, I am now thinking more of, you know, "What is the problem?", cause, which once before I never was (pause) I never thought about that (pause) so, that's something that (pause) has changed for me from this class

What is interesting about this excerpt is that although this student is describing how a design element (i.e., problem identification) can be integrated into the nursing perspective, they also allude to their initial understanding of the design process, in general, as associated more with an engineering disciplinary marker than nursing. However, as noted above, the alignment of an engineering disciplinary marker to design expertise did not dictate this student's interpretation of their ability to contribute to problem identification.

This tendency was reflected in other excerpts where nursing students had a tendency of indicating that they were able to utilize their previous experiences in clinical setting to describe

and identify potential problems to their engineering peers. For instance, another nursing student offered that, due to their own experiences as a nurse, keeping accurate records could be a potential challenge in any healthcare setting:

[Student, N:] like (pause) you know (pause) I don't know how to explain that, but like just sharing it like communication is like really big problem sometimes with healthcare, going from shift to shift, and different nurses and doctors and whoever else is in the room, and just *having* the numbers, like (pause) if you're like, "Oh I thought that was on 42 yesterday and now it's on 30" (pause) and (pause) you can just go look in their chart, "Oh it *was* supposed to be 42 and I just didn't hear it wrong," or something (pause) and then that's going to save the patient money in the future because you won't have to send them for an x-ray, you'll know exactly where it's supposed to be, you wouldn't have to send them (pause) for all the other things and

Problem Solving (Product Improvement). While in the clinical immersions students were asked to engage in problem identification, in the design phase of the course they were asked to maneuver other aspects of the design process, including: modeling, brainstorming, product development, modification, testing, and improvement, *inter alia* (Arce et al., 2015; Hanington & Martin, 2012; Sanders & Geist, 2016). In general, these are aspects associated with the inquiry learning and problem solving features of the design process (Arce et al., 2015; Bransford & Stein, 1993; Sanders & Geist, 2016). For nursing students, several of the descriptions associated with problem solving involved empathetic rationales associated with either patient care or the effectiveness of the nursing staff. In one particular instance, a nursing

student was describing a potential solution to patient care that involved improving the comfort of the patient by eliminating the use of needles. For engineering students, problem solving was geared more towards the improvement of the devices or technological equipment observed in the clinical facilities. One engineering student offered an example of their understanding of this design process in the following reflection of the third clinical immersion:

[Student, E:] And it's (pause) and it's awesome to see like (pause) in this system, in the hospital, I feel like a protruding machine would not be as, I mean it wouldn't be such a big deal, but uh in this environment [a medical aircraft carrier] you'd want one that lays flat against the machine or something like that so (pause) it's still not protruding and you can, you know, in this scenario, in a fast-paced situation they wouldn't just (pause) knock it off, like they said, that little plastic little piece that they said they break all the time

In another example, an exchange between a nursing student and an engineering student offers insight into the different ways they initially tackled problem solving throughout both the clinical and design phases of the course:

[Student, N:] Uh sure, I'll go (pause) Um so it's um (pause) it's coming from different perspective (pause) um whereas I come in and I work in a hospital setting (pause) I'm not used to going around checking out, "Well how can I better this? How can I better that?" I'm just used to uh (pause) using materials I have to, to uh complete my job, so (pause) it's kind of like coming in with a different mindset like, "Hey, let's see what I can do to

make my job easier (pause) or make somebody else's job easier" rather than just going in and just completing it just to get it done

[Student, E:] Uh I come in from with *totally* different mindset than that (pause) I'm not used to this setting at *all* uh (pause) so I don't really know how it all, it's kind of hard for me cause I don't know how it works, but I know I want to fix it (pause) so when you don't know the problem it's kind of harder to fix it, but uh that's been (pause) kind of a cool experience cause you learn a lot more from being in the uh, like being immersed in it, then you would like, "I'm going to read this book and find other problems," cause then you don't know all the uh like side details that (pause) are going to get in the way of the design

Again, here both students allude to a disciplinary marker (Identity Task); however, neither indicates that their understanding or engagement with problem solving was either hindered or enhanced by this alignment (Significance or Politics Tasks). Rather, it was just noted that there were different approaches to problem solving that could be informed by previous experiences, expectations, or understandings.

Leadership. The Leadership theme was categorized by patterns in student language that utilized a combination of three prevalent Building Tasks – Significance, Relationship, and Activities Tasks (Gee, 2004, 2008). The theme Leadership captured instances where students were describing experiences, observations, or interactions that they felt were of value to the group or the prototype development (Significance Task) often denoting specific actions that they took or were anticipating taking (Activities Task) as contributing members of the team (Relationship Task) (Gee, 2004, 2008). Two main sub-themes comprise this overarching theme:

Attitude and Teaching. In the sub-theme Attitude, students would describe instances where they were willing to go outside of their comfort zone to engage in activities that were more challenging for them for the benefit of the entire team. In the sub-theme Teaching, students would describe instances in which they would adopt the role of teacher in order to help their group members comprehend challenging or unfamiliar concepts.

Attitude. Attitude was a particularly prevalent sub-theme within the Leadership category as it offered not only insight into what students thought were personal struggles, but also what type of thinking processes they adopted to overcome these struggles in an effort to be a contributing member of their group. This was considered leadership because students were willing to put aside their own limitations to personally persevere as part of their efforts towards their team's overall success. Early in the semester, several engineering students noted their own struggles within the clinical immersions in their capacity to engage with the clinical staff and patients. In reflecting on these struggles, those that successfully navigated later clinical immersions indicated that they did so through external preparation, including: performing outside research, learning new terminology, being mentored by their nursing peers, and preparing questions prior to the immersions. For nursing students, several indicated a willingness to be open to new experiences and a desire to learn new elements related to modeling and design despite their seemingly challenging nature.

This is particularly true for elements of the design phase of the course where nursing students had a tendency to reflect feeling out of their element. For example, one nursing student emphasized their anticipated excitement for learning about the modeling software, SolidWorks, despite mentioning earlier in the conversation that the mathematical concepts involved in modeling was conceptually challenging for them:

[Student, N:] But, um, I'm excited about Monday, learning about the computer program and stuff, I was glad, I was kind of worried that we weren't going to get to go cause (pause) like Friday worked good for them [engineering students], but not for us [nursing students], we have clinical (laughter) but, so, I was kind of worried that we weren't gonna be able to go, so I'm excited that we're actually going to get to go and like learn the (pause) engineering, like the modeling - I guess that's what you call it - on the computer

Another illustration of this type of attitude is captured in the exchange between an engineering and nursing student reflecting on their team's experience in designing their prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). In this discussion, both students identified an acceptance of failure as essential to endure the challenges presented as part of the design process:

[Student, E]: You have to accept a lot of failures (laughs)

[Researcher]: Okay, which means you have to try a bunch of stuff

[Student, E]: You have to try a bunch of stuff and be willing to try different ideas (pause) I think -at least something that I've kind of struggled with quietly - has been like, "oh well I have this idea, but that's not what they're saying" and so I'd just sit here and listen but then it's like, "oh well that's actually kind of a good idea" (laughter) maybe I should accept that idea a little bit more (uh huh)

[Student, N]: I uh I'm definitely uh I was the same way I uh (pause) 'cause I, I have like (pause) my roommate also - [my roommate is] an engineer - and so I'd bounce ideas off

[my roommate] and so [my roommate would be] like, well “you know I’d do this” and and I’d say, I’d come up with a really good idea and then [engineering student is] like “Well, what about this?” And I was like, “Well, that’s kind of better than my idea “and uh (laughter) I was like “I need to come up with stuff, but I kind of like that” (laughter) “so let’s apply this to [the engineering student’s] idea and just leave mine out of the situation” (laughter) it’s, it’s, it’s kind of cool though how everybody just, uh played a part in it (yeah) so

Teaching. In reflecting on their experiences or observations of the CIDI course, both nursing and engineering students indicated that throughout the course, they would be in positions where they were learning from one another. In reflecting on these instances, students would indicate times in which they acknowledged that their disciplinary marker allowed them familiarity with either a setting or the knowledge relevant to navigate that setting that was advantageous. The instances where these advantages became teaching moments were the ones that were identified as part of this sub-theme. For the majority of the nursing students, these moments were more prevalent in the clinical immersions where they could either model proper patient care and interaction behavior or explain unfamiliar processes or terminology that might be foreign to their engineering peers. The following reflection of this type of behavior was captured in one of the nursing student’s responses regarding their experience in the clinical immersion settings. In this, the student also observes the instances where they are learning from the engineering students as well:

[Student, N:] I've enjoyed the teaching part of it

[Researcher:] Can you expand on that? (laughter)

[Student, N:] Yeah I, I mean as far as the medical portion (pause) cause (pause) well were, like, I've already been an LPN for five years so (pause) I've enjoyed being able to actually you know explain things that when they are not sure on something and, of course (pause) the mechanical stuff they can explain back to me because, of course, I have no clue! So (pause) I, mean I, I've actually really enjoyed that. I'm actually looking forward to (pause) the uh oh well the uh ah device clinic which was awesome and um (pause) I'm actually looking forward to the ER or the ICVU uh

Another excerpt of an exchange between a nursing and engineering student offered the following reflection of a teaching moment within the group:

[Student, N:] Oh yeah! It *was* an NG tube! (laughs) I was just trying to like show them [engineering students] (pause) exactly like (pause) what it looks like (pause) like placed inside

[Student, E:] Yeah, yeah like how far down it goes

[Student, N:] like how far down it goes because, I mean, like we showed them like the measuring thing, which (pause) I mean, kind of shows them where it goes (laughter) but uh just to see it like in the body and like what it actually looks like *outside* of the body because we didn't have the real one yet

[Student, E:] Yeah yeah

[Student, N:] at that time, so I was just trying to show them [engineering students] exactly like (pause) what it is because, I mean, you can explain something all day long until they see it (pause) I think, they're not really going to understand everything

The engineering disciplinary marker became more relevant in the design phase of the CIDI course according to student excerpts in the archival data; however, this did not imply that teaching moments were not a central part of the clinical immersion experiences as well. For engineering students that reflected on such instances, teaching moments in either setting tended to involve the clarification of technical terminology, explanations regarding the mechanics of a design, or instances of product development. In the following example, an engineering student reflects on their role as a teacher in the design phase of this course while also acknowledging that their nursing peers predominantly held that position in the clinical phase:

[Student, E]: It's definitely different from the clinical setting too (pause) it's been like a whole, the group's kind of changed from (pause) the leader I guess, not really the leader, but like we got a lot from [nursing student] in the clinical setting and now we've gone to like you, "okay this is a life" to "here is how you draw something in SolidWorks," "here's how you do this," or "let's talk about these drawings" and (pause) there's a lot more that I feel like the engineering side can bring to the table as far as like walking the system, or doing, it's like things that you wouldn't necessarily think of, you just kind of assume that they work because you're used to them working and other odd things so I, I think that *that's* been beneficial as well

Team Dynamics. The Team Dynamics theme is categorized by patterns in student language that utilized a combination of three prevalent Building Tasks – Relationship, Significance, and Sign Systems Tasks (Gee, 2004, 2008). The excerpts within this theme incorporated instances where students’ reflections centered on how the members of the group interacted with one another (Relationships Task), the value of certain types of interactions (Significance Task), and how such interaction contributed to the design of their prototype or to help them better understand another aspect related to the course (Sign Systems Task) (Gee, 2004, 2008). Arguably, students’ reflections of these instances offered insight into their own perceptions of their group’s ability to achieve a deeper understanding of a concept through social interaction. The sub-themes associated with the Team Dynamics theme focus on highlighting the difference between the two types of sign systems associated with their group interactions. The instances where students reflected on positive team dynamics that demonstrated their ability to interact with one another, exchange ideas, or brainstorm new designs are encompassed in the sub-theme Confidence. This sub-theme was labeled as such because students’ reflections often incorporated an attribute of confidence in their team’s ability to succeed in the final design of the prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). In other instances, student reflections indicated moments where the exchanges they shared with their group members offered them an opportunity to expand their own understanding of a specific subject or of the other disciplinary marker represented in the group. These instances comprise the sub-theme Understanding as they denote a new realization or deeper comprehension obtained through peer interaction.

Confidence. Although the archival data contained several reflections regarding students’ experiences interacting with one another, the sub-theme of Confidence denotes specific instances

where these reflections highlight positive interactions with regards to the group's design processes. For example, both engineering and nursing students described moments during the CIDI course where they remember interacting with their peers in such a way that facilitated ideation and brainstorming. This type of interaction was captured in the following exchange between two nursing students and an engineering student describing their observations of the most significant experiences they could recall from the design phase of the CIDI course:

[Student, N1:] Just being able to actually look at the (pause) the STATLOCK (pause) from the catheter

[Student, E:] I mean (pause) also just us four sitting around, you know (pause) talking and (pause) thinking things through and (pause) you know, shooting out ideas and maybe (pause) um, you know, either saying, "Yeah that's good," or "No, we can do this instead," or

[Student, N2:] Or somebody else's idea might, might not work (pause) but, but like you can take (pause) a branch off of it and just, we just like (pause) you know, we started with this little tiny seed and we've now branched out quite a bit because we've just all inputted so much

[Student, N1:] Yeah, yeah

[Student, E:] But essentially the mixture (pause) of, of all those things have all been (pause) uh very useful

Another group's recollection of their interaction with one another during the design phase of the course also reflected similar sentiments. In particular, an exchange between two nursing

students described the interactions that they had during this phase as a valuable part of the development of the prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016).

[Student, N1:] We've just (pause) I mean we've always just really *bounced* off of one another and that's (pause) for us it's worked, so (laughs)

[Student, N2:] Yeah

[Student, N1:] watching ju- (laughs)

[Student, N2:] it has worked out really well, it's just kind of like somebody will be talking and will solve that problem and somebody else will just pull up another thing we need to talk about (pause) and it's just different every time and it works really well

Understanding. Wherein the Confidence sub-theme highlighted instances where students described positive group interactions that contributed to the design of their prototype of innovative technology, the Understanding sub-theme encompassed a more expansive scope where such interaction led to a deeper comprehension of any aspect related to the CIDI course (Arce et al., 2015; Sanders & Geist, 2016). In these instances, the discourse would highlight moments where students would promote common ground amongst the group members and offer appreciation for new insight gained. For example, in several excerpts two teams reflected on a newfound appreciation and a deeper understanding of the struggles and workload associated with the disciplinary counterparts their group. In one recollection, one of these teams recounted a bonding moment they had during the semester where students from both disciplines had consecutive high stakes exams during the course of a week. In another instance, an exchange

between a nursing student and an engineering student revealed that through their interactions they had developed a deeper awareness of what their professions entailed and the commonalities shared between them:

[Student, N:] Well, first of all I never knew what (pause) a chemical engineer did

[Researcher 1:] (laughs)

[Researcher 2:] Yeah

[Student, N:] I just (pause) thought, you know, “You’re a chemical and an engineer,” and you’re like, “Ok, well then that’s like molecules and stuff,” so (laughs) I don't know, I don't know what they do, um

[Researcher 2:] Those 27 part instructions (laughter)

[Student, N:] (laughs) Exactly, yeah (pause) like what in the world was that? (laughs) so, um but (pause) I definitely see how you can take (pause) to be a chemical engineer, and their mantra, and how it can relate to the medical field (pause) I mean, can’t, can’t chemical engineers go on to get, like (pause) they could be doctors

[Student, E:] Yeah

[Student, N:] So, I mean (pause) it’s, it’s a path to take so

[Researcher 2:] Alright, yeah

[Student, E:] I think that it’s bright (pause) like I didn't ever think that nursing was as technical as it is (pause) like I was like, “Oh you take care of patients, you make sure they don't die,” and now I'm like, “Oh they have to do like (pause) a *crap-ton* of stuff *all the time*”

The teams that did reflect on this type of mutually beneficial and engaging interaction also tended to express a stronger discernment for the value both disciplines contributed to the field of healthcare.

Stage Two of the Critical Discourse Analysis

For the second stage of the critical discourse analysis, Gee's (2004, 2008) Theoretical Tools of Inquiry are employed to comprehend how the themes from stage one are reflective of the larger socio-cultural context represented by the CIDI course with regards to power and knowledge construction. A major component of Gee's (2004, 2011) approach to *critical discourse analysis* is to advance from an understanding of the patterns prevalent in specific uses of language (i.e., stage one of this cda) to a broader understanding of the implications of these language patterns within specific contexts (i.e., stage two of this cda). Such connections can be made because of the assumptions encompassed in the larger conceptual framework of *critical discourse analysis* which contend that language carries social implications via the processing and internalization of meaning (Brissett & Mitter, 2017; Fairclough, 2013; Gee, 2004, 2008; Rogers, 2004; van Dijk, 1993). These social implications are subsequently situated within power dynamics that dictate the value, and actions resulting from these exchanges (Brissett & Mitter, 2017; Fairclough, 2013; Gee, 2008, 2011; Rogers, 2004; van Dijk, 1993).

As noted in chapter one, Gee's (2004, 2008) Theoretical Tools of Inquiry are described as follows: the capacity to derive meaning within specific contexts (*situated meanings*); the significance of norms, values, traditions, and expectations with which such exchanges are associated (*Discourses*); the different sign or knowledge systems being used, exchanged, or developed in specific contexts (*social languages*); and the underlying theoretical models that govern the social world in which these exchanges were made (*figured worlds/cultural models*)

(Rogers, 2004, p. 12).²⁷ Aligned with the purpose of this dissertation, this stage employs Gee's (2004, 2008) Theoretical Tools of Inquiry to explore how power manifests in the discursive patterns reflected in the themes from stage one and how such manifestations influence knowledge construction.

The Manifestation of Power

As noted in stage one of the analysis, the theme of Positioning comprised certain language combinations, with the dominant being an Identity Task in which students' description of an experience in the CIDI course derived from a specific disciplinary marker (i.e., either a nursing perspective or an engineering perspective) (Gee, 2004, 2008). Students who indicated such a disciplinary marker also perceived that such affiliation awarded them certain advantages or disadvantages (i.e., Politics Task) within specific settings associated with the CIDI course (i.e., either the clinical immersion or the design phase) (Gee, 2004, 2008). These perceived advantages or disadvantages impacted their ability to navigate particular bodies of knowledge (i.e., Sign Systems Task) within a setting and dictated how they interacted with their peers and the immediate environment (Relationships Task) (Gee, 2004, 2008). This type of positioning tended to align with students' pre-conceived socio-cultural expectations affiliated with the various settings of the CIDI course, which influenced the level to which students' perceived their ability to contribute within these social contexts (Gee, 2004, 2008).

²⁷ As noted in chapter one, Gee (2004, 2008) distinguishes Discourses with a capital "D" from discourses in that the former encompasses socially laden implications derived from norms, values, traditions, and expectations and the latter simply denotes lingual communication (e.g., written or verbal exchanges).

Understanding the combination of these language tasks as interpreted by Gee's (2004, 2008) Theoretical Tools of Inquiry awards a more thorough interpretation of students' socio-cultural contexts that might lead to the initial expression of such statements. For instance, the incorporation of a disciplinary marker within students' discursive patterns (e.g., "from a nursing perspective" or "as an engineer") is indicative of the larger cultural model from which that student is interpreting their experiences within the CIDI course.²⁸ Within the context of the CIDI course, the students' choice of a particular disciplinary marker was also indicative of their preferred cultural model (i.e., either nursing or engineering) which dictated how they positioned themselves within each setting: either as an outsider or an insider. As Gee (2004) contends, cultural models are influenced by specific values, beliefs, and knowledge associated with larger Discourses that explicate how things work and what is deemed "normal" within certain socio-cultural contexts (p. 36). In this case, students who denoted a disciplinary marker to understand their experiences in the CIDI course were deciphering what their setting *should* look like from a certain "normalized" perspective rooted in their disciplinary framework (Gee, 2004, p. 36).

This stage of the critical discourse analysis thus commences with the themes Positioning, Expectations, and Ability to Contribute because they delineate the primary cultural model from

²⁸ As noted in chapter one, figured worlds and cultural models are often combined in Gee's (2004, 2008) work with the latter encompassing a more expansive description of the conceptual characteristics of both (e.g., narratives, images, oral traditions, frozen theories, and generalizations that inform social reality). For the purpose of this analysis, I employ the use of cultural models to embody all of these conceptualizations in lieu of delineating both concepts as distinct (i.e., figured worlds/cultural models) (Gee, 2004, 2008).

which students interpreted their respective role within a particular social context and, to a degree, their actions in that context (Gee, 2004, 2008). As noted, the more students expressed that their disciplinary cultural model was either aligned or unaligned with the social contexts which they experienced, the more they were able to understand the social languages being utilized and the situated meanings connected to these exchanges (Gee, 2004, 2008). At the same time, if the Discourses connected with these social realities were unaligned with their disciplinary cultural models and the expectations derived from these pre-conceived understandings, the more students tended to express that they were unable to contribute within that particular social context (Gee, 2004, 2008). Students' subsequent positioning in the course, their expectations, and their actions ultimately describe how power initially manifested with the context of the CIDI course: via imbalances associated with disciplinary advantages (Gee, 2004, 2008; Literat, 2016).

As indicated by the extant literature on gender theory, both the nursing and engineering disciplines have certain values, traditions, expectations, and bodies of knowledge that comprise elements of the cultural model associated with each discipline (Coleman, 2013; Heilman, 2012; Watt & Eccles, 2008). These norms influence how individuals linked with these models *should* act with regards to specific settings (Coleman, 2013; Gee, 2004, 2008; Heilman, 2012). For example, nursing has often been associated with traditional Euro-Western feminine gender roles wherein patient care, service roles, and supportive interactions are central aspects of the responsibilities associated with the profession (Coleman, 2013; Watt & Eccles, 2008). Engineering, in contrast, emphasizes norms and roles of traditional Euro-Western masculine gender social identities where rationality, logic, and systemic thinking are considered central to the responsibilities associated with the profession (Heilman, 2012; Watts & Eccles, 2008). This type of cultural model was illustrated by CIDI course nursing students who expressed that, due to

their “nursing perspective,” when they entered into the clinical setting, they were more focused on patient care and program identification associated with improving such care. Wherein, the engineering students from the CIDI course who expressed an “engineering perspective,” also indicated that they were more concerned with product development or systems improvement in the clinical setting. Both are, arguably, aligned with the cultural models with which they are familiar.

When such cultural models were not competing for leverage in a particular context, students from both disciplines expressed an acknowledged appreciation of where both disciplines intentionally overlapped: healthcare (Gee, 2004, 2008). This was an intended objective of the CIDI course that purposefully emphasized the similarities and overlap of both disciplines at the interface of healthcare challenges (Sanders & Geist, 2016). The following excerpts of an engineering and nursing students portray this observation. Both begin by acknowledging their own disciplinary markers and therefore the cultural models in which they were predominantly functioning; however, in the course of their reflection they indicate an unknown and welcome overlap that these two differing models had at the interface of healthcare. From the engineering perspective, this student communicated:

[Student, E]: (laughs) Uh I would um say that it's [working with each other] been pretty eye-opening (pause) uh (pause) and I've said this before, I think in the last time we talked but it's uh (pause) you learn a certain way to talk to another engineer, and uh in a lot of the engineering classes that's all you see, like (pause) especially every class you're only talking to engineers and you, you learn like there's just certain things like that (pause) you do say, you don't, and you can kind of like eye certain processes and so

(pause) and so when you talk to somebody that thinks differently, like a nursing student (pause) like, there's been kind of a communication thing like that we've definitely learned (pause) and it's just been eye-opening, like "this is how I communicate with a group that's not just a bunch of engineers just trying to work through it, like a group project" (pause) um (pause) but, I, I, it's been really enjoyable too (pause) just to get like a different perspective and to open (pause) uh your mind up to something that uh you wouldn't have thought of - like uh I wouldn't have paired nursing and engineering but it (pause) it's extremely relatable on both, on both ends of it

In response, their nursing peer offered the following statement from their perspective:

[Student, N]: Yeah, I agree, I mean (pause) two totally different mindsets but uh somehow you mesh ideas together and (pause) I don't know, [engineering student is] thinking in systems, I'm thinking (pause) people are coming in and their system's not working so (laughter). I'm trying to fix it and [engineering student is] trying to come up with a valve to fix it (laughter) so uh um it's (pause) I mean it's pretty cool the uh (pause) just the different mindsets you get (pause) where (pause) I think when like, when typically like where nursing is um like you may have your patients but I mean like, as a nurse you're working with your whole group, you're communicating um you gotta relay messages and uh engineers are doing the same thing but with different, different aspects and so (pause) that whole um (pause) that whole mindset of communicating with them, and having them think differently then what you're thinking, I mean it's just (pause) there's no telling what you're gonna come up with so uh (pause) yeah

This exchange also indicates that particular cultural models house certain norms and rules associated with the social languages and situated meanings associated with each disciplinary “mindset” (Gee, 2004, 2008). As each discipline focuses on explicit bodies of knowledge that are both academically and professionally relevant to be successful within that career path, it is easier for individuals utilizing the same cultural model to communicate with one another (Coleman, 2013; Gee, 2004, 2008; Hall, Stevens, & Torralba, 2005; Heilman, 2012; Tuori & Vilen, 2011). This is common as individuals from the same discipline share the same social languages and, therefore, meanings from these exchanges can be more readily interpreted (Gee, 2004, 2008; Hall et al., 2005; Tuori & Vilen, 2011). However, in working with individuals that are not communicating from the same cultural model and who therefore do not share the same social language, deriving meaning from such exchanges is more difficult (Gee, 2004, 2008; Hall et al., 2005; Tuori & Vilen, 2011). As Gee (2008) contends, situated meanings derive from contextually relevant exclusion and inclusion principles that make discursive exchanges either simple or complex depending on the overlap of relevant contextual markers; the more overlap, the less guessing the individuals in the exchange must do to understand and derive meaning. In accordance, the ideal would then be to have students’ successfully converge their cultural models at the interface of healthcare, so that their communicative exchanges could be more readily transferable via a common social language between the two disciplinary markers (Campbell, 2005; Gee, 2004, 2008; Hall et al., 2005; Paulus & Nijstad, 2003; Tuori & Vilen, 2011).

The disciplinary cultural models with which nursing and engineering students aligned themselves as they reflected on their experiences and observations in the CIDI course also incorporated larger, socio-cultural Discourses that influenced their expectations within different settings of the course. This was reflected in the Expectations theme identified in stage one of the

critical discourse analysis. As noted by Gee (2008), “Discourses are ways of being ‘people like us.’ They are ‘ways of being in the world’; they are ‘forms of life’; they are socially situated identities” (p. 3). Arguably, the central, clinical settings (e.g., the Intensive Care Unit, the LifeFlight center, the device clinic) and the design settings (e.g., the MakerSpace, the engineering classrooms and labs) associated with the CIDI course are all contexts which hold specific socio-cultural markers that indicate how to properly interact with the setting, the resources, and the individuals representative of those spaces (e.g., nurses in hospital act a certain way versus design professionals in the MakerSpace) (Gee, 2004, 2008; Foucault, 1993, 2007). The more aligned the expectations are to a social context, the more will be the level of comfort in navigating that space (Gee, 2008; Foucault, 1993, 2007). In terms of power, such a sense of familiarity offers a high sense of efficiency with regards to engagement and interactions as the acknowledged norms are already understood (Gee, 2004, 2008; Foucault, 1993, 2007). In the case of the CIDI course, when students reflected on particular expectations regarding certain settings, they were in actuality expressing familiarity to particular Discourses associated with the context in which they were interacting (Gee, 2004, 2008).

Further, when students’ expressed that their experiences aligned with their expectations, it was an acknowledgement that the social reality they observed matched the Discourses they were familiar with in association with that context (Gee, 2004, 2008). A few examples include when nursing students would express contentment reflecting on their experiences in the clinical immersion settings that reaffirmed that they were in the “right profession.” When students’ expressed that their experiences were unaligned with the expectations they held, it was an acknowledgement that the social reality they observed did not match the Discourses they thought were representative of that context (Gee, 2004, 2008). A few examples of this include when

nursing students that reflected on their experiences in the design phase would indicate an acknowledged misperception of what design entailed (e.g., the complexity of the design process versus the perceived simplicity of the final product). In discussing the design process with their group members, the following nursing student provided insight into their expectation of the design process versus their actual experience:

[Student, N]: Um well it's been a lot of a bouncing ideas off each other (pause) um a lot of compare contrast of what we have now and how we're going to make it better (pause) um and really it, it's why hasn't (pause) we can't find information on it because (pause) I (pause) apparently nobody else thought of this idea so I don't know if that's a good or bad thing (pause) and so um it also has a lot to do with uh (pause) not just bouncing ideas off of each other but “how are you going to *design* this idea?” (pause) and that's been the biggest factor (pause) where we're gonna (pause) what the design looks like, and kinda visualizing it in multiple sketches and then you uh (pause) people trying to design it for you and you can't really describe exactly how you want it to look like and you don't have the parts that you need to de-, describe it so yeah (pause) it's uh, I mean it's, it's uh been fun but it's been difficult

In some instances, students that reflected on their expectations of different settings within the course and compared their actual experiences indicated a type of *newness* associated with the whole process. From these expressions, it can be understood that the Discourses they were familiar with entering into the different settings of the CIDI course were not expansive enough to provide them with a particular expectation of the environment or the experience (Gee, 2004,

2008). Students that reflected of this type of newness indicated that, for example, they had a limited understanding of the complexities of hospitals or other clinical settings and therefore were simply creating their own, new, understandings of the space. In these instances, it can be argued that students were creating their own Discourse associated with both the clinical and the design settings affiliated with the CIDI course based on their experiences in the course (Gee, 2004, 2008; Foucault, 1993, 2007). This provided students an advantage over their peers who were needlessly tied to the expectations and misalignments derived from preconceived notions associated with the space in that they could explore the context with an unconstrained mindset (Gee, 2004, 2008; Foucault, 2007; Lim, 2014).

The Discourses affiliated with particular settings integrated into the CIDI course (i.e., clinical or design) were also influential in determining what type of knowledge, customs, values, or norms were privileged in these social contexts. Gee (2008) contends that humans can identify with a variety of Discourses by adopting a primary Discourse (which provides an initial understanding of self and belonging) and combining such with various secondary Discourses that allows them recognition within a multitude of contexts (Gee, 2004, 2008). As noted previously, meanings can change and contexts can shift; therefore, the Discourses that individuals associate with might also change and sometimes cease to exist within their socially constructed reality (Gee, 2004, 2008; Foucault, 1993, 2007). This type of shifting was particularly prevalent when students reflected on specific instances in which their perceived ability to contribute was either influenced by their affiliation with a particular disciplinary marker (i.e., dependency) or impacted by their experience within a setting that became unaligned with their pre-conceived expectations of that setting (i.e., feeling overwhelmed) (Gee, 2004, 2008). This was evident in the examples encompassed in the theme of the same name (i.e., Ability to Contribute). In terms

of power, such an alignment between cultural model, Discourses, and context offered students a heightened sense of relevance within that space (Gee, 2004, 2008; Foucault, 2007; Literat, 2016). As indicated in the CIDI course archival data, those unfamiliar with the Discourses associated with a space were less likely to be able to make an effective contribution in that setting (Gee, 2004, 2008). This is particularly important to note for collaborative learning environments where all students are expected to contribute to the conversation (Anderson, 2013; Brooks, 2013; Felder & Brent, 2015).

For example, the students that reflected on this type of experience tended to denote a certain level of dependence on their peers that had disciplinary markers that aligned more with their perceived notion of the norms, knowledge, and values affiliated with that particular social context. When this dependency was noted, students indicated that their ability to understand the social language or interact with personnel or resources within that setting was limited due to their disciplinary marker that determined their inexperience or unfamiliarity with that particular social context (Gee, 2004, 2008). This type of dependency can be associated with Gee's (2004, 2008) conceptualization of cultural models: for example, because students' known Discourses with clinical settings have indicated that nursing students' cultural models are more aligned with the expectations associated with these settings, they are expected to know more and be more familiar with such settings than the engineering students. The opposite is true for engineering students in the design settings affiliated with the CIDI course: as the students' known Discourses have indicated that the design settings are more aligned with the disciplinary cultural model of the engineers, it is expected that these students know more and will be more familiar with the elements of these social contexts (Gee, 2004, 2008). In believing this to be the case, students that expressed dependency on their peers whose disciplinary markers were more aligned with a

particular context also indicated familiarity with the social languages and situated meanings connected to these social contexts to be a central element of this dependency (Gee, 2004, 2008).

The following examples depict this type of dependency. In the first example, an engineering student described their limitations in navigating the clinical immersion setting (i.e., engineering students on nursing students within this setting):

[Student, E:] And uh I'd definitely say it's uh very different from any other class for that reason where you're (pause) uh you're almost learning as much from, or more from your peers (pause) as much as you are the teachers, because, I mean you see them before and after, but there's that (pause) two and a half, three hours in between where (pause) I'm going, if you're an engineer in a nursing setting, you need to be told uh by a nurse and such like, you know, what's this? What's that? Or, I don't know, how does this work? Or else you will be completely lost. So I think it's really unique in that aspect

For nursing students, their disciplinary maker (in which their cultural models of the CIDI course were based) limited their ability to contribute to the design process. In this example, a nursing student reflects on their initial advantage in being able to understand the social languages affiliated with the Discourses linked to the clinical immersion settings (Gee, 2004, 2008). However, when they entered into the design phase of the course their unfamiliarity with the design process left them more dependent on their engineering peers to navigate the unfamiliar terrain:

[Student, N:] Yeah, yeah like where, where like we already have the knowledge of the medical setting (pause) well, I can have all the ideas to create this, this design that uh, to increase, like, to increase like whatever it may be (pause) but (pause) how in the world am I gonna make it? So (pause) whereas my knowledge lacks in that area, that's where the engineers come in and are like, "This is (pause) okay well, here's what we can do"

[Student, E:] "This is how you can make that" (laughs)

Their engineering peer's remark to this reflection is indicative of their familiarity with the social languages and situated meanings of the design process (Gee, 2004, 2008). By understanding the Discourses associated with design this engineering student is expressing their ability to navigate this context to a higher degree than what is being expressed by their nursing peer (Gee, 2004, 2008).

There were also instances where despite having an advantage in knowing particular social languages and situated meanings associated with a social context, this was not enough to make a contribution in that setting (Gee, 2004, 2008). For nursing students who expressed this type of feeling, it tended to be in the clinical immersion setting where either the social language being used was so specified it was out of their field of knowledge or the environment was so different from their own experiences (e.g., the device clinic was very technical) that their disciplinary cultural model was not enough to help them navigate the environment (Gee, 2004, 2008). For engineering students who expressed this type of feeling, the context tended to be within the design phase of the course where they were engaging with elements of design that were out of their original disciplinary-based field of knowledge (e.g., not having worked with SolidWorks prior to the course and having to figure it out on their own in order to engage with

design) (Gee, 2004, 2008). In one particular instance, for example, an engineering student expressed that they felt they let their team down because they were unable to provide the type of expertise needed to utilize a specific computing software properly.

Ultimately, the way that students' expressed their positioning as either insiders or outsiders within a specific social context in the CIDI course also indicated the preferred cultural models and the Discourses that they utilized to understand their expected role and subsequent contributions within that specific environment (Gee, 2004, 2008). If the disciplinary cultural model that they utilized to understand their immediate environment aligned with the pre-conceived notions comprising the Discourses affiliated with that social context, students tended to express an ability to navigate the social languages and situated meanings derived from such contexts to a higher degree than their peers whose cultural models did not align with the Discourses connected to that setting (Gee, 2004, 2008). In accordance, the Discourses that students expressed through their expectations of the various clinical immersion or design settings were affiliated either more so with the nurses' cultural model (i.e., the clinical immersion setting) or the engineers' cultural model (i.e., the design settings) (Gee, 2004, 2008). These affiliations either allowed them to have a better grasp of the knowledge, norms, and traditions associated with these social contexts or a higher level of dependency on their disciplinary counterparts (Gee, 2004, 2008).

In relating this back to the concept of power, I turn back to its definition, wherein the significance power holds lies with its potential to empower or silence students in social interactions (Barker, 2012; Foucault, 1972, 1980, 1981; Thayer-Bacon, 2000). I contend that these perceived alignments or misalignments with the students' understood disciplinary cultural models influenced how power manifested in their reflections of their experiences and

observations in the CIDI course (Gee, 2004, 2008). When their cultural models were more aligned with the context and the Discourses they held before engaging with the environment, students expressed that they were better able to navigate that settings as compared to their disciplinary counterparts whose cultural models were not aligned (Gee, 2004, 2008). Their perceived ability to contribute within a particular setting also dictated their level of dependency on their disciplinary counterparts. Effectively, students' disciplinary cultural models determined their level of perceived empowerment within a setting based on the favorable elements these cultural models allotted them within a particular social context (i.e., fluency in the social languages being utilized or a deeper understanding of the situated meanings associated with these languages) (Gee, 2004, 2008).

The Role of Power in Knowledge Construction

As the CIDI course was designed to provide students a collaborative forum in which to construct new knowledge in the form of a prototype of innovative technology, the discursive patterns found in stage one of this analysis are also explored to better understand how the power dynamics illustrated above influenced knowledge construction (Arce et al., 2015; Gee, 2011; Sanders & Geist, 2016). For this purpose, the exploration shifts to the discursive patterns associated with students' expressions as defined by the themes of Engagement, Design Expertise, and Leadership. Although Identity Tasks were integrated into several of the examples associated with these discursive patterns, the prevalence was more centered on other Building Tasks including the Connections, Politics, Significance, Activity, and Relationship Tasks (Gee, 2004, 2008). This is important to note because these Building Tasks emphasize students' comprehension of what they believed played an important role in the design process of the prototype of innovative technology and are therefore closely tied to the concept of knowledge

construction (Arce et al., 2015; Sanders & Geist, 2016). The following analysis thus focuses on the discursive patterns embodied by these themes as they represent Gee's (2004, 2008) conceptualization of the Theoretical Tools of Inquiry to better understand the role of power in the knowledge construction process as expressed by students' reflecting on their experiences and observations in the CIDI course.

Similar to patterns observed with students' expressed ability to contribute, the type of activities (i.e., as described in the theme Engagement) that students reflected on were related to the disciplinary cultural models they employed to understand and interpret their relevance with regards to their immediate surroundings (Gee, 2004, 2008). For example, students would often utilize Activity and Significance Tasks to indicate what type of interaction or contribution within a specified environment was considered valuable within that specific social context (Gee, 2004, 2008). The use of these particular Building Tasks therefore implicated students' understanding of the perceived advantages or disadvantages (i.e., Politics Task) that helped them define their ability to understand complex technical knowledge or engage with professionals and resources within a social context as based on their disciplinary marker (Gee, 2004, 2008). As Gee (2004, 2008) posits, these indicators may signal a more global understanding of the types and forms of social languages necessary to navigate and understand situated meanings derived from such interactions. In the case of students who did reflect on what types of interactions were valuable within a specified setting, such reflections tended to align with the disciplinary cultural models that were utilized to initially navigate said environment (Gee, 2004, 2008).

One illustration of this point is embodied by nursing students who indicated that talking with patients and the nursing staff within the clinical immersion setting came easier to them because of their disciplinary background. This implication signaled a connection to the benefits

of the cultural model they believed most aligned with this particular setting (Gee, 2004, 2008). Due to nursing students' familiarity with a cultural model associated to the Discourses and social languages lineated to a clinical space, nursing students were able to capitalize on these advantages and engage with the environment via activities like talking with the nursing staff or interacting with the resources of the space (Gee, 2004, 2008). This was particularly true of the nursing students that had either worked in such environments prior to enrolling in the CIDI course, had family members that were in the nursing profession, or that were in a higher academic level within the nursing program which granted them exposure to other types of clinical immersion training. Arguably, these prior experiences afforded these nursing students more exposure to the Discourses surrounding what it means to be a nursing professional which granted them leverage in understanding the nuances of complex social languages found within these environments and their subsequent situated meanings (Gee, 2004, 2008). Effectively, the ability to make sense of these meanings within this context influenced the degree to which these students could contribute to the knowledge construction process in this space (Gee, 2004, 2008; Literat, 2016).

In contrast, engineering students who alluded to a misalignment with the clinical immersion environment highlighted that their disciplinary cultural model was not as unified with the context as that of their nursing peers (Gee, 2004, 2008). This power imbalance shifted their role to more passive forms of engagement (i.e., listening or observing) as they were arguably less familiar with the Discourses and social languages necessary to engage with the environment in the same capacity as their nursing peers (Gee, 2004, 2008; Literat, 2016). This type of dichotomy is captured in the observations that nursing students had of their engineering peers (e.g., wishing that they would ask more questions, speak more to the nursing staff, or take the

lead in the discussions in these spaces) as well as the engineering students of themselves (e.g., indicating that they would like to ask more questions in the next immersion setting, feeling discomfort in trying to interact with patients, being overwhelmed by the amount of new information offered by the new environment).

In the following exchange between a nursing and an engineering student, each student indicates a level of familiarity or unfamiliarity associated with the clinical setting as defined by the disciplinary cultural model they utilized and the affordances of the social language fluency associated with that perspective:

[Student, N:] [In the clinical immersions] We've had a lot of knowledge base, like

[Student, E:] Yeah

[Student, N:] Just kind of like the (pause) founda, the groundwork for (pause) I mean, you come in the very first day and we went to the CVICU and (pause) they're throwing around like, "Well he's got a swan line, we got wedge pressures, we got all this, that," and she's looking like (pause) (laughs) "I don't even know..."

[Student, E:] It was a foreign language, basically (pause) would be the best comparison for that

As with the other themes hitherto analyzed, in the design phase of the CIDI course this type of disciplinary cultural model alignment seemed to be the inverse of what students observed in the clinical immersion phase (Gee, 2004, 2008). For engineering students, their disciplinary cultural model aligned more with the Discourses associated with the design settings of the course that, in turn, granted them more familiarity with the social languages utilized and the situated meanings

derived from these exchanges (Gee, 2004, 2008). Similar to their nursing peers, engineering students that had previous experiences with the equipment of the MakerSpace (e.g., the 3D printer), design software (e.g, Solidworks), or other resources relevant to the design contexts through their engineering program were granted more exposure to the Discourses, social languages, and subsequent situated meanings derived within these contexts that better equipped them to navigate these spaces (Gee, 2004, 2008). This familiarity offered them an increased possibility to contribute to their group's overall knowledge construction process, wherein it also limited nursing students' role in the same processes in this phase of the CIDI course (Anderson, 2013; Literat, 2016).

Overall, the alignment of a disciplinary cultural model to a particular social context within the CIDI course not only impacted what students perceived they were able to contribute in this space, but also what type of activities they were engaging in with regards to this context (Gee, 2004, 2008). The perceived familiarity granted to students via the alignment of their disciplinary cultural models not only allowed them to position themselves as insiders familiar with specific social contexts, but also as conduits of knowledge translation and construction for their peers (Gee, 2004, 2008). The more they were able to engage in an active manner with the space (i.e., talking and interacting) rather than passively (i.e., listening and observing) the more they reflected that they were able to affect change in their group's overall benefits from the social context in question. For example, as per the archival data, the more nurses were able to help their engineering peers maneuver the clinical immersion space, the more they indicated that were able to engage in thoughtful conversation regarding the identification of their design challenge (Arce et al., 2015; Sanders & Geist, 2016). Wherein, the more engineering students expressed that they able to help their nursing peers navigate the design spaces of the CIDI

course, the more the expressed engagement with thoughtful conversations regarding the design of their prototype (Arce et al., 2015; Sanders & Geist, 2016). As the purpose of the CIDI course was to engender such transformative dialogue with regards to the design of a prototype of innovative technology, it is important to note what type of exchanges facilitated such interaction (Arce et al., 2015; Sanders & Geist, 2016)

The following excerpt from two engineering students regarding the design process illustrates this process. Being more familiar with the space and the resources of the design environment, the engineering students observed that through various efforts, they were essentially able to facilitate the fluency of their nursing peer in the dominant social languages of the space to progress their design (Gee, 2004, 2008):

[Student, E1]: Drawing a lot of sketches (okay) of, I think one of our biggest roadblocks that we've hit is communicating what we're thinking (chuckles) to somebody else, 'cause it would be like, "oh yeah, let's do this," and I'm like, "oh, but I don't understand this," and [nursing student is] like, "no, this is actually what I'm talking about" (laughter) like, "you clearly don't understand my idea right now" (pause) So (pause) there's been a lot of having to, working through the communication barrier, so (pause) but I think there's more of a communication barrier than anything because once we get like, "oh, ok I see what you're talking about" then we move forward to the next step and like, "ok let's look at how we're going to do this" (pause) But yeah once you get past that initial communication (pause) I think things flows a lot better (pause)

[Researcher]: Have you developed any "tricks of the trade" so to speak, to kind of help you communicate or help you put that vision on paper?

[Student, E1]: Well, we've used a lot of paper. Remember when I said this? (*sound of tapping notebook*) And remember when I drew that for 20 minutes and you [nursing student] finally got it? (laughter) (pause) "...now apply that to this part of it"

[Researcher]: yeah yeah

[Student, E1]: Um uh, ya'll got anything?

[Student, E2]: Yeah well like what, what really we would do is ah share something similar and then (pause) and then applies its similarity to what, to what's our idea, and explain it, or (pause) draw it. Yeah, we got better at drawing in this class (laughter)

[Student, E1]: We're like artists (laughs)

Developing the skills associated with transformative dialogue, knowledge construction, and design expertise is a central component of the CIDI course for both nursing and engineering students (Arce et al., 2015; Sanders & Geist, 2016). In the discursive patterns associated with the overall theme of Design Expertise students reflected on their own ability to engage with problem identification and problem solving – two components associated with these aforementioned skills (Anderson, 2013; Arce et al., 2015; Cross, 2006; Sanders & Geist, 2016). Of the themes linked to knowledge construction, this theme embodied the utilization of the Connections Task which implicated students' abilities to link significant contributions to either activity based on their disciplinary marker (Gee, 2004, 2008). In general, these connections can be associated with the development of a new cultural model reflective of the overlap between the two disciplinary cultural models utilized by students in the CIDI course (Gee, 2004, 2008). As they developed this new cultural model it can be argued that students shifted their positioning

and engagement within certain social contexts of the CIDI course to reflect this new perspective (Gee, 2004, 2008; Literat, 2016).

The elements affiliated with this new cultural model presumably emphasized Discourses affiliated with design over that of the Discourses embraced by either nursing or engineering (Cross, 2006, 2009; Gee, 2008; Jonassen, 2011). In other words, the norms, values, activities, and traditions that “make a designer” became distinct from those associated with what it means to “be a nurse” or “be an engineer” (Coleman, 2013; Cross, 2006, 2009; Gee, 2008; Watt & Eccles, 2008). The development of this new type of cultural model affiliated with the design aspects of the course arguably facilitated students’ ability to make a contribution in either the problem identification or problem solving aspects of the design process regardless of their disciplinary background (Gee, 2004, 2008; Sanders & Geist, 2016; Tuori & Vilen, 2011). For example, nursing students who reflected on this type of connection had a tendency to refer back to their nursing disciplinary marker, indicate how they initially perceived their engagement with design elements, and then observe how they have managed to converge these two overlapping fields to better engage with their engineering peers. However, the development of this new cultural model was dependent of the degree to which the overlap between design expertise and their original disciplinary marker was established (Gee, 2004, 2008). In the following, varying levels of this type of convergence between design expertise and their original disciplinary marker are portrayed.

At the highest level, students expressed a fluency with design aspects of the course that, for them, was considered a new skill that aligned with their disciplinary marker. The nurses that reflected on this type of convergence did so primarily with regards to problem identification wherein they observed how a familiar social context (i.e., a clinical immersion setting) could

converge with this specific design-based activity (Arce et al., 2015; Sanders & Geist, 2016). In the following example, a nursing student reflects on their experience engaging with problem identification within the clinical immersion setting. Here, the student indicates that they were originally working from their disciplinary cultural model (i.e., nursing) while simultaneously employing design expertise (in the form of problem identification) regarding the issue of technical cords (Gee, 2004, 2008). This resulted in a more nuanced understanding of the clinical setting from a combined design-nursing perspective:

[Student, N:] It, it was (pause) kind of a, a two-fold

[Researcher 1:] Okay

[Student, N:] because where (pause) I've already dealt with them [technical cords] (pause) as a nurse, and then (pause) hearing other nurses say that, the uh exact same problems and then of course where we learn in school (pause) of all the issues that they already have with them, so, I mean, it (pause) the problem's *been* there but just (pause) it seems like nobody's really (pause) you know, it's like, "Oh, they've, we've gone this way except, uh, for so long, so (pause) why bother changing it?" You know, "We're just used to it"

[Researcher 2:] Yeah (pause) yeah (pause) or maybe they don't know how (pause) to change it? Like, you know, uh

[Student, N:] Yeah (pause) so I mean, this use-, gives you (pause) you know, it gives us an opportunity to, to finally take something that everybody has just (pause) dealt with all these years and say, "Hey (pause) let's see if we can come up with a better way to do this"

To another extent, the convergence of design-discipline cultural models was more difficult for some students, particularly if a common social language was not intentionally developed (Gee, 2004, 2008). In an observation made by another nursing student, they reflect on their perceived ability to engage in more demanding activities associated with the problem solving processes of the course (Arce et al., 2015; Sanders & Geist, 2016). In this excerpt, this nursing student indicates that past a certain point, the overlap between the problem solving elements of the design cultural model and their nursing cultural model was non-existent, rendering any effort on their part non-complementary to the overall design process (Gee, 2004, 2008):

[Student, N:] Uh (pause) I, I've heard other groups say stuff like, "Well (pause) like we did, like the nursing (pause) did the brainstorming but (pause) *they're* doing the mapping because that's above our pay grade!" (laughter) And uh the drawing and the prototyping and stuff like that (pause) and the chemical engineers are like, "I have no clue what they want but, then, when they told us, I can run with that"

In a different exchange between a nursing student and an engineering student, the nursing student reflects on their contribution to the problem identification process of design, wherein their engineering peer reflects on their own experiences with the same process (Arce et al., 2015; Sanders & Geist, 2016). The nursing student begins with aligning their initial contribution as derived from their disciplinary cultural model (i.e., nursing), and the engineering student follows suit with the perspective derived from their disciplinary cultural model (i.e., engineering). Both indicate the convergence of a design cultural model to their own disciplinary markers to differing degrees:

[Student, N]: Um, we kind of started like (pause) like, like [engineering student] said, it kinda started in here and it got my mind thinking, we went to the ER and I was like, “well why don’t we just get rid of these blunt tipped needles?” (pause) and so I’m thinking, “well, what’s going to be the best way to get rid of this” and (pause) a lot of times I (pause) they may or may not consider it but, as a nurse, one of the main things I’m thinking is infection (pause) infection control is *huge* and they’re just trying to come up with a system to uh make it work (pause) and so you uh gotta think, “well if I got a ? that’s sitting in this vile for periods of time, is that gonna cause some type of (pause) reaction?” And, and so there’s, there’s different things but (pause) my, my mindset of kinda, I think (pause) me being the nurse, I was kinda like, I kinda *helped* pick out what we were gonna do whereas they, when I bounced my ideas off of them, they’re like, “ok, well, we can work with that” (pause) and uh (pause) that’s how it started

[Student, E]: Yeah I would say that had a lot to do with it, and also just the uh, like [nursing student] was saying engine, well like, as an engineer, you’re just trying to say like, “well how do I make the system work?” Well if the systems already working, you don’t think of why it’s an issue (pause) so (pause) [nursing student] saying like, “oh yeah, needles, needles sticks and stuff, well you gotta get rid of that” and I’m like, “oh well, I can work with that!” like if you gave me the problem I could fix it but to look at the system that was already implemented, there *wasn’t* an issue (pause) so there wasn’t a reason to fix it. So I think having that different *look* at it, but having somebody else look at it and be like, “oh well this is an issue that you’re not really seeing” (pause) is what has kind of brought this idea

From the engineering perspective, this student is referring back to their disciplinary cultural model as a source of a specific type of design expertise (i.e., problem solving) (Gee, 2004, 2008). Instead of engaging with problem identification, this engineering student observes that through their disciplinary cultural model they were more familiar with fixing specific products (i.e., problem solving aspects associated with design expertise) than they were in problem identification (Gee, 2004, 2008). One issue that this student observed concerned their ability to understand the situated meaning associated with what might be considered challenges within the clinical immersion setting (Gee, 2004, 2008). For a nurse, this type of activity might be more aligned with their disciplinary cultural model; their familiarity with the setting and the social languages utilized by the nursing professionals in the environment provide them with contextual cues that would allow them to decipher the situated meanings associated with such exchanges (e.g., the first convergence example about a nursing student and technical cords) (Gee, 2004, 2008). However, for engineering students that reflected on their experiences within the clinical immersion setting, their perceived ability to contribute to the design process and their subsequent type of engagement with this environment were influenced by the disciplinary cultural model they were utilizing (Gee, 2004, 2008).

For both nursing and engineering students, their perceived ability to construct knowledge with regard to the design of their prototype was therefore dependent on how well they could converge or connect their existing disciplinary cultural model to that of a design oriented cultural model (Arce et al., 2015; Gee, 2004, 2008; Sanders & Geist, 2016). In the case of both engineering and nursing students, their familiarity with the Discourses and social languages of the environment in which they were interacting with during the CIDI course was indicative of how well they could merge these distinct, overlapping cultural models (Gee, 2004, 2008). In

some scenarios, like in the example below, a better understanding of what a design cultural model entailed helped students to make these connections to better navigate the overall design process (Gee, 2004, 2008):

[Student, E]: I think this course in general has caused that to be drawn out ‘cause (pause) you don't (pause) I don't know, you're not really thinking of problems until you you're like, “oh, now I have to thinking of a problem” (laughter) so just being presented with that, “hey you're going to need to fix something” (pause) gets your mind flowing (pause) to be like, “ok! Well now I need to start looking for problems” (laughs)

[Researcher]: Yeah

[Student, N]: And and then you (pause) find out a problem and you're like, “oh this is how you can solve it” and then you figure out, “oh well, that ain't gonna work,” (laughter) and so then you try something else and you're like, “oh that ain't gonna work” (laughter) and then after about a hundred times of “that ain't gonna work” (laughter) you finally like go over and find something that *might* work and you still don't know if it's gonna work and uh (pause) So it's like uh plan a hundred and fifty (laughter)

This capacity to make connections and create new Discourses associated with a new cultural model were consequently the result of efforts embodied by leadership opportunities embraced by students within the course (Gee, 2004, 2008). Within the discursive patterns offered by students' reflections of their experiences and observations of the CIDI course with regards to the overall theme of Leadership, observations associated with specific attitudinal markers (i.e., flexibility and willingness to learn) and teaching opportunities were predominant.

Of the themes linked to knowledge construction, the Leadership theme embodied the utilization of the Relationship Task that implicated students' understanding of their perceived association relative to a particular cultural model or to their peers embodying a particular cultural model associated with a specific disciplinary marker (Gee, 2004, 2008). In particular, when students indicated a level of flexibility with regards to their comfort in engaging with aspects of the course that were outside of or unaligned with their disciplinary cultural models they directly contributed to their group's overall success (Gee, 2004, 2008). This is due in part because by being open to new ideas, students were being exposed to new Discourses and social languages that would eventually facilitate their interaction with their peers and better contribute to the knowledge construction process (Anderson, 2013; Gee, 2004, 2008; Literat, 2016). Some examples of this flexibility include nursing students' positive attitude towards learning seemingly complex design modeling techniques despite their initial indication that math and engineering concepts were not within their particular academic strengths. For engineering students, this type of attitude tended to be expressed in both the clinical and design settings where either the environment was unfamiliar or the techniques were more advanced than the knowledge they currently possessed.

Within these scenarios, students' attitudes delineated a readiness to exit from the predominant Discourses influencing their understanding of their immediate environment in an effort to refine, include, or switch between varying Discourses to help contribute to their group's development of the prototype of innovative technology (Arce et al., 2015; Gee, 2004, 2008; Sanders & Geist, 2016). In the following example, both an engineering and a nursing student reflect on the actuality that delving into areas of design expertise that were initially unfamiliar to them was part of what made the course enjoyable:

[Student, E:] I think *that* (pause) like getting to know things that I would have never learned, cause I have (pause) it's not like I took the anatomy class, I haven't been in nursing (pause) Like I don't get to be in this atmosphere so (pause) the three hours I get a week of, "Oh this is what this is and this is what that does," is (pause) really (pause) it's just extra knowledge that, that I, I may or may not need but it's, it's nice to know (laughs)

[Student, N:] And I mean I'm kind of (pause) like I'm looking forward to uh actually *creating* our design cause (pause) I don't get to work in the Makerspace and all this stuff in the library, and get to work doing 3D printing and stuff so (pause) it's out of my element and I'm like (pause) it's kind of new and I'm like, "Okay, well," (pause) "I like, I, I love working with my hands and stuff," so, it's kind of like you get to do nursing and hands-on stuff, well, let's create something that helps the nursing profession, so

Both students observed that despite initially being unaligned with their original disciplinary cultural models and the Discourses that they were most familiar with coming into the CIDI course, they enjoyed observing or engaging with distinct elements that they would otherwise not engage with in a traditional course (Gee, 2004, 2008; Sanders & Geist, 2016).

The other discursive pattern identified within the Leadership theme denotes instances where students observed that they became the teachers within a certain social context for their disciplinary counterparts (i.e., sub-theme Teaching). In such scenarios, students employed their advanced familiarity with a particular Discourse associated with a specific social context to assist their peers understand an unfamiliar Discourse and social language in order to create and understand situated meanings in these contexts (Gee, 2004, 2008). As indicated in earlier examples, when students' disciplinary cultural model did not afford them familiarity with the

Discourses or social languages relevant to a particular social context, it became like a “foreign language”, diminishing their overall level of engagement (Gee, 2004, 2008). Facilitating everyone’s ability to understand important elements of the Discourses affiliated with particular social contexts subsequently raised the entire group’s capacity to interpret situated meanings derived from this context and contribute to knowledge construction (Anderson, 2013; Gee, 2004, 2008; Literat, 2016). For nursing students who indicated that they experienced such teaching moments, their disciplinary cultural model’s alignment with the clinical immersion setting allotted them more familiarity with the Discourses of that setting to become teachers to their peers with regards to medical terminology, patient care techniques, and essential training elements (Gee, 2004, 2008). For engineering students who noted teaching moments as part of their reflections of the CIDI course, their disciplinary cultural model’s alignment with the design settings of the CIDI course granted them more teaching moments in these social contexts with regards to the modeling equipment, software, or engineering processes.

For one group, the two nursing students’ ability to teach their engineering peers about a particular patient care technique concerning the insertion of a Nasogastric Intubation (NG) tube was invaluable to their design process. Although these nursing students were teaching their engineering peers how such an instrument was being utilized, they were in tandem contributing to the expansion of their peers’ exposure to the medical terminology and equipment (i.e., social languages) frequently utilized and seen within the clinical settings (Gee, 2004, 2008):

[Student, N1:] Yeah, so a lot of the time *visualization*

[Student, E:] Um hm

[Student, N2:] What uh would be helpful

[Student, N1:] is the key, so

[Student, N2:] So, that's what I was just trying to do (pause) trying to show them a picture
[of an NG tube] because I thought it might help (laughs)

[Researcher 1:] Well it (pause) that clarifies it! (laughter) I was like, "Ok"

[Student, N2:] Yeah (laughs) that was it (laughs)

[Student, E:] and there are, there are some things that can be explained by just describing
it, or

[Student, N1:] Yeah

[Student, E:] and talking about it, but (pause) pictures definitely help more in uh this
setting, I feel like

[Student, N2:] Yeah

[Student, E:] to explain some of the things we were discussing

[Student, N1:] and understanding that that's actually used for, you know (pause) stuff
going in or pulling stuff out, so

[Researcher 1:] Yeah (pause) the functionality of it

[Student, N1:] Yeah, yeah, you know, it's a, it's a two-fold thing, so

[Researcher 2:] It's important to know what you're using it for (laughter)

[Student, N1:] Yes! (laughs) yeah, I guess, if you're suctioning it out, don't put stuff back
down it! (laughs) No!

For most students who reflected on having teaching moments throughout the course, they also tended to mention how valuable such moments were for the group's overall communication and knowledge construction efforts (Anderson, 2013; Hall et al., 2005; Tuori & Vilen, 2011).

Overall, the willingness of students to be flexible when it came to leaving their disciplinary cultural model and familiarity to specific Discourses associated with particular spaces implicated their ability to expand their (and through teaching) their peers' disciplinary cultural models (Gee, 2004, 2008). These Leadership elements are indicative of how malleable students' cultural models are as well as how resilient students are when they chose to learn how to fluctuate between the more phantasmagorical aspects of their primary cultural models (Gee, 2004, 2008). By being flexible and allowing their peers the opportunity to be introduced to fundamental aspects of their own disciplinary cultural models, students created a new type of Discourse which then empowered them to make significant contributions to their group's design processes (i.e., problem identification and problem solving) (Arce et al., 2015; Gee, 2004, 2008; Sanders & Geist, 2016). In learning to identify these opportunities and capitalizing on the innovative spirit of the course, students were also granted the opportunity to construct new knowledge through the convergence of two disciplinary cultural models that overlapped with respect to issues of healthcare.

Ultimately, the collaborative efforts embodied by the CIDI course culminated in the creation of a prototype of innovative technology that addressed a healthcare challenge (Arce et al., 2015; Sanders & Geist, 2016). Based on the discursive patterns captured by students' reflections of their experiences and observations in the CIDI course archival data, it is evident that through these interactions, students were engaging with knowledge construction processes that reflected their navigation of underlying power dynamics inherent in the clinical immersion and design contexts. Such power dynamics permeated students' expressed level of engagement within particular social contexts as either high or low levels of interaction as reflected by students' perception of the alignment of their disciplinary cultural models to that space; students'

understanding of their ability to contribute to specific design expertise processes (i.e., problem identification or problem solving) as determined by how well they could integrate aspects of the design cultural model and social language to that of their own disciplinary cultural models; as well as their observed leadership traits which were observably prevalent when students' disciplinary cultural models allowed them the ability to either be flexible in learning a new social language or to teach their peers the social languages necessary to make situated meanings within particular contexts (Gee, 2004, 2008). With regards to power, it can then be understood that how it manifested (via an initial disciplinary imbalance) also influenced knowledge construction in that it empowered or hindered students' abilities to engage in transformative dialogue associated with their group's overall design process (Arce et al., 2015; Sanders & Geist, 2016; Turaori & Vilen, 2011). Arguably, the more students were able to create new cultural models and integrate new Discourses into their original disciplinary frameworks (via teaching and flexibility) the better they were able to overcome this original power imbalance (Gee, 2004, 2008; Literat, 2016; Turaori & Vilen, 2011).

Comments on Collaboration

As a collaborative learning course, it is important to understand the intricate dynamics expressed by students' discursive patterns in their reflections of their experiences of the CIDI course as they offer valuable insights into aspects of interdisciplinary interaction (Sanders & Geist, 2016). For this purpose, the two sub-themes (i.e., Understanding and Confidence) embodied by the Team Dynamics theme are relevant. In the first sub-theme, students' expressed an enhanced understanding of one another's disciplinary markers (wherein in the second sub-theme, students acknowledged an overall satisfaction with their team's ability to communicate and work together with regards to the design of the prototype of innovative technology (Arce et

al., 2015; Sanders & Geist, 2016). In analyzing these dynamics with regards to Gee's (2004, 2008) Theoretical Tools of Inquiry, the underlying observation is that the more individuals of each group were able to teach one another various aspects of their disciplinary cultural models (e.g., how, as a nursing student, they understand the clinical setting versus how, as an engineer, they understand the design setting) the more those individuals that positioned themselves as outsiders in these settings became more fluent in the social languages and situated meanings affiliated with these spaces (Gee, 2004, 2008). When this occurred, students were able to express an increased understanding and an enhanced confidence in their team's overall dynamics.

With regards to increased understanding, students reflected on how their interactions afforded them the opportunity to change their mindset within a particular social context. For nursing students that reflected on such interactions, they also expressed a deeper comprehension of the type of disciplinary focus that their engineering peers brought into the clinical immersion settings. Wherein the nursing students would focus on patient care, for instance, their engineering peers might focus on product or device improvement (Arce et al., 2015; Sanders & Geist, 2016). The same was true of engineering students that reflected on their interactions with their nursing peers in the design spaces: where their focus might be on the processes related to the design element, their nursing peers would often remind them that the design was meant to function in a clinical setting with actual patients. In this case, nursing students were integrating social languages prevalent in the clinical social contexts into the design spaces in order to make their prototype more relevant (Arce et al., 2014; Gee, 2004, 2008; Sanders & Geist, 2016).

Discussing these distinct disciplinary cultural models and understanding how their peers of a different discipline might interpret the social languages exchanged within a particular

context allowed students to not only expand their own understanding of the space, but also increase their capacity to make sense of situated meanings that might only have been previously interpretable by those familiar with that context (Gee, 2004, 2008). The following excerpt provides an example of this type of exchange and the value that students' placed on such interactions. Primarily they expressed value in enhancing their understanding of different contexts within which they were otherwise unfamiliar due to their affiliation with a disciplinary cultural model that was not aligned with the primary Discourses associated with that space (Gee, 2004, 2008). In this part of the excerpt, an engineering student reflects on their interactions with a nursing peer and how such exchanges were mutually advantageous for the group as they moved through varying social contexts:

[Student, E:] I think we have pretty open communication, like (pause) I think we all three of us have been pretty much (pause) willing to say, "Hey, I don't know what that does," or "I don't know what's going on" or if we *do* know what's going on then, "Hey, I can do it this way, let me *show* you," (pause) and I think that's been really helpful (pause) [the nursing student] was saying about the uh (pause) uh 3D printing, I actually have prior experience in that so, the roles are about to reverse, where I'm going to be like, "Hey! This is what, uh this happens," and "This is what's going on here," (laughs) but uh I think we've all really kind of conformed to be a nice group of uh communication and we're willing to help each other (pause) and understanding that they don't, like I have no prior knowledge (pause) and I don't, I don't *have* to know it cause I haven't been taught it, whereas (pause) [the nursing student] *knows* it, so [the nursing student] can share it, so that's been really beneficial

Within the same group, another exchange between the nursing student and their engineering peer illustrates a particular example in which their interaction was valuable in the design process of their group's prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). In this exchange, a "gray space" is identified within which they were able to establish a mutual dialogue about the design of their prototype (Arce et al., 2015; Sanders & Geist, 2016):

[Student, N:] So I, I didn't, I didn't know how to make (pause) whatever my idea was (pause) so I was like, I can, I, I was sitting in my room and like kind of drawing up designs, for like what I, what I think *could* work (pause) and then I'm like, well (pause) my roommate's actually in engineering so [my roommate is] like, "Well, what about this?" So, I was like, "Well, this could work," and (pause) it's like, "Well, well what about this?" and I, I'm like thinking from the nursing standpoint of like, "You guys consider infection control? You guys consider all this other stuff?" Whereas engineers are like, "What's infection control? This is just what you need to do to design this" (laughter) so

[Student, E:] This is *the* answer (laughs)

[Student, N:] So (laughs)

[Student, E:] No, I'm like uh

[Student, N:] Yeah, yeah no there's a lot of "gray area," and in there somewhere is where engineers are kind of like, like

[Student, E:] And playing off that as well there's been a lot of, "Oh, well let's do that!"

"No, that won't work because of this," like (pause) we can't just create rules, like we got to follow uh certain (pause) laws of physics (laughter) so (pause)

[Student, N:] What?! (laughs)

[Student, E:] Well now, well now that works both ways

[Student, N:] What's a physics? (laughs)

[Student, E:] So I'm like, "Oh! We can do this," and [the nursing student is] like, "No because you got to think of (pause) X Y and Z of (pause) the nursing department" so

The gray area that was identified could possibly be the convergence of where both of the disciplinary cultural models merged in the design process. In this gray area, there were certain elements of their cultural models' inherent social languages that allowed them to communicate and establish situated meanings that were valuable to the creation of their prototype of innovative technology (Arce et al., 2015; Gee, 2004, 2008; Sanders & Geist, 2016). This also relates back to the leadership characteristics that were previously identified; primarily, the flexibility to move in and out of an established cultural model and the willingness to teach others about a particular cultural model so that they may become fluent in the social languages utilized to create situated meanings in specific contexts (Gee, 2004, 2008).

In the case of enhanced satisfaction with their group's overall dynamics, it can be argued that the more they were able to teach one other of their distinct disciplinary cultural models, the more they were able to fluidly make valuable connections through their communicative exchanges (Campbell, 2005; Gee, 2004, 2008; Hall et al., 2005; Tuori & Vilen, 2011). Students that reflected on such instances tended to express satisfaction with their group via a confidence in their group's ability to create a product that was a reflection of their entire team's efforts. These types of exchanges not only expanded their own understanding of the Discourses affiliated with their peers' disciplinary cultural models (i.e., what it means to be a nurse versus what it

means to be an engineer) but also what type of overlaps exist between these disciplinary cultural models (Gee, 2004, 2008). The following two examples provide an illustration of both of these points. In this excerpt, two nursing students reflect on their initial impression of engineering students and how that evolved over the course of the semester through their interactions with their team's engineers:

[Student, N1:] Yeah, I was scared of engineers (laughter) (pause) I'm not gonna lie (laughter) (pause) When I thought of an "engineer" I thought, like (pause) I don't know, like the goggles, they're like sitting at a computer, like they're *super* smart (laughter) like, they know all the math in the world and uh like (pause) I'm *super terrible* at math so they're gonna think that I'm the *stupidest* person in the world, like they're not going to like me, they're gonna think that I'm *slow*, like (laughter) (pause) I was so scared, but they were so nice

[Student, N2:] Like when we were looking at somebody on the whiteboard back there and somebody goes, "Oh yeah, that's like (pause) sophomore math," and I'm like, "yeah, not happening" (laughter)

[Student, N1:] I was scared about that, but they've been so nice and so wonderful and (pause) I'm not scared of them anymore (laughter) so that's been nice (laughter)

In this next excerpt, a nursing student observes that they have come away from the course with a bettering understanding of the engineering profession stemming from a perspective that they both share - that of a student:

[Student, N:] Yeah, completely new uh (pause) every group project I've ever been in, in my life has been like (pause) in classes where like everyone was aiming for the same goals (pause) so like everyone was in like AMP for this or everyone was in chemistry, but it was (pause) it was nice being with the completely different mindset because (pause) I mean, like I said, they (pause) not only do you get to work with students which is really nice because, like I mean, we're all like discussing our schedules, "We have a test this week," "We need get this taken care of this week," but um (pause) having someone from a, a field, that's full of challenges as well, um (pause) that you have to approach from different aspects that was really nice (pause) that uh, that really like, kind of opened up the way like I approach different problems now, so uh

Within both disciplinary cultural models, the Discourses affiliated with being a student in a demanding program were prevalent because they provided common ground within which students could establish communication (Gee, 2004, 2008). Sharing these commonalities allowed students to better understand one another and establish a new Discourse derived from the experiences and interactions they had together in the CIDI course (Gee, 2004, 2008; Sanders & Geist, 2016). As a result, students who reflected on such experiences also indicated a new understanding of what it meant to be a nurse or what it meant to be an engineer.

The Next Step

The purpose of this chapter was to present the findings from the critical discourse analysis conducted for this dissertation. This analysis was implemented in two stages that were anchored in Gee's (2004, 2011) approach to critical discourse analysis. The first stage of this analysis focused on identifying discursive patterns (i.e., themes) within the CIDI course archival

data tagged with Gee's (2004, 2008) Building Tasks. This stage utilized Gee's (2004, 2008) Seven Building Tasks to analyze the themes that emerged from the application of Braun and Clarke's (2006) steps for thematic analysis, to identify major patterns within the discourse utilized by students as they reflected on their experiences and observations of the CIDI course. From this analysis, seven major themes were identified: Positioning, Expectations, Ability to Contribute, Engagement, Design Expertise, Leadership, and Team Dynamics.

The second stage of this analysis focused on connecting these themes to larger, societal dynamics that were reflective of students' own observations of their experiences within the CIDI course. This stage utilized Gee's (2004, 2008) Theoretical Tools of Inquiry to describe how the Building Tasks that comprised the major discursive patterns identified in stage one of the analysis were indicative of larger, societal influences that impacted students' actions and interactions throughout different societal contexts represented in the CIDI course. These connections provided an analytical framework by which to understand how students were utilizing discipline-specific cultural models (i.e., either a nursing or an engineering cultural model) to interpret the clinical immersion or design settings of the course (Gee, 2004, 2008). These cultural models were indicative of the students' level of familiarity with the Discourses and social languages associated with each social context (Gee, 2004, 2008). These two stages of analyses were anchored in the research questions that comprise the pith of this dissertation. Specifically, this exploration centered on how power manifests in the discursive exchanges developed by engineering and nursing students reflecting on their experiences and observations in the CIDI course, as well as understanding the role of power concerning new knowledge construction as reflected in this archival data.

Chapter six comprises the final chapter of this dissertation. It commences with a discussion of the findings from the two stages of the critical discourse analysis followed by a conclusions that can be derived from this dissertation as a cultural studies project. As part of this discussion, the main takeaways from the critical discourse analysis are conceptualized via cultural studies scholarship and connections are offered as to how these answer the research questions for this dissertation. The pedagogical implications regarding collaborative learning spaces in general follow this section. As part of these implications, connections back to Gee's (2004, 2008) Theory of Language and how instructors in collaborative learning spaces can leverage aspects of this theory to improve their students' interactions as part of a larger learning process are highlighted. Future paths for this area of research are also integrated into this larger discussion. This chapter concludes with final remarks on the study and a reflection of interdisciplinary, collaborative work in general.

CHAPTER 6
THE FINALE
A CULTURAL STUDIES DISCUSSION, UNDERSCORING KEY TAKEAWAYS AND
PEDAGOGICAL IMPLICATIONS

Introduction

At the beginning of this dissertation, this work was presented as a cultural studies project aimed at exploring how power manifests in collaborative learning environments at the undergraduate level. The inspiration for this dissertation is rooted in a desire to comprehend how power is constructed within undergraduate student exchanges and, in turn, influences students' abilities to work together to form innovative connections. From a cultural studies lens this exploration is anchored in the assumption that power – which holds the potential to empower or silence students - is an inherent element in social interaction and therefore also part of collaboration (Barker, 2012; Thayer-Bacon, 2000). It would follow, then, that a better understanding of the power dynamics inherent within collaborative learning environments would facilitate the implementation of pedagogical practices that could help address or alleviate power imbalances in these interactions. The purpose of this investigation was thus not only to improve student learning within collaborative contexts, but also to further the implications to teaching that could help advance interdisciplinary communication and new knowledge construction.

In chapter one, the Clinical Immersion at Disciplinary Interfaces (CIDI) course – an undergraduate, interdisciplinary, collaborative learning course – was introduced as the contextual framework for this dissertation. *Critical discourse analysis* provided the conceptual framework

and Gee's (2004, 2008) approach to *cda* the analytical framework for this dissertation.²⁹ Both are connected to the conceptualization of this dissertation as a cultural studies project as they focus on language (in the form of discourse) as representative of the socio-cultural and historical factors which influence the manifestation of power in social reality (Fairclough, 2013a; Foucault, 1977, 1980, 1982; Gee, 2004, 2008). Archival data in the form of focus group transcripts and debriefing notes, which captured students' reflections of their experiences and observations working together throughout one semester of the CIDI course, provided the discursive data for this dissertation.

Acknowledging the multifarious nature of collaboration, chapter two presented existing scholarship from three distinct lenses: group dynamic models, communication studies, and critical social theories regarding knowledge construction. In order to situate this investigation within the appropriate extant literature, I highlighted these fields of scholarship as they relate directly to elements of interest within this dissertation. Chapter three introduced the archival data from the CIDI course and outlined the methodology utilized for this dissertation: a critical discourse analysis following Gee's (2004, 2008) approach to *cda*. Within this chapter the original data collection process, my responsibilities within this process, and the implications with regards to my role as a researcher and the trustworthiness of this work were delineated. Chapter four built on the foundations of chapter three and detailed the CIDI course as the contextual

²⁹ As noted in previous chapters, the use of *critical discourse analysis (cda)* is derived from Rogers' (2004) conceptualization of the term which provides a more holistic version of the approaches and theories embodied by the field. When used as critical discourse analysis, it refers to the actual analysis conducted.

framework for this dissertation. Within the contents of this chapter, the following information was highlighted: the postsecondary setting within which the course was designed, the motivation, curricular design, learning theories, and the pedagogical techniques. The point was emphasized that the CIDI course provided a unique, educational context within which to investigate power dynamics in an undergraduate, collaborative setting. Chapter five followed with the presentation of the findings of the two stages of the critical discourse analysis conducted for this dissertation.

Purpose and Organization

The purpose of this chapter is to build on the findings from chapter five and offer a comprehensive discussion regarding the implications of this dissertation and future possibilities for this line of research. I also present this chapter as a way to resume the line of focus on this dissertation as a cultural studies project, highlighting the works' connections to my initial motivation and the significance of understanding power within collaborative educational settings at the undergraduate level. As part of this effort, key takeaways derived from the findings of the critical discourse analysis and the pedagogical implications that these takeaways have with regards to bettering student interaction are underscored. These conclusions emphasize how this analysis responds to the primary research questions driving this work by providing unique insight into an undergraduate level collaborative learning space. This discussion spearheads the issue of the complexity inherent in collaborative learning spaces and the various ways in which this topic could be further explored through differing scholarly lenses.

The remainder of this chapter is organized as follows. An overview of the findings from chapter five in relation to the overarching research questions is offered. This is followed by a cultural studies discussion of the key takeaways from this work and the pedagogical implications that can be derived and applied to future collaborative learning environments at the

undergraduate level. New ideas for future research in this area of educational scholarship are then introduced. This dissertation concludes with final remarks concerning the CIDI course, interdisciplinary work in general, the direction in which this type of work is headed, and the significance of continued educational research in this area.

Overview of the Findings

The objective of this dissertation was to explore how power manifests in the experiences and observations offered by students enrolled in a collaborative learning course at the undergraduate level (i.e., the CIDI course) through reflections captured in archival data collected from this course. Conceptualized as a primarily descriptive study, I explored these experiences and observations by applying a critical discourse analysis to the discursive practices recorded as reflections in the CIDI course archival data. The following research questions anchor this exploration:

- 1) How does power manifest in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?
- 2) What is the role of power concerning new knowledge construction as reflected in the discursive patterns used by engineering and nursing students' reflecting on their experiences and observations working in a small (three to four students), interdisciplinary group?

As hitherto stated, *critical discourse analysis* and Gee's (2004, 2008) approach to *cda* provided the conceptual and analytical framework, respectively, for this dissertation. These were chosen

because not only are they necessarily interdisciplinary – which is essential when exploring complex learning spaces like collaborative environments – but the very purpose of such frameworks is to uncover power dynamics as they manifest in language (Gee, 2004, 2011; Lim, 2014; Rogers, 2004). Gee's (2004, 2008, 2011) approach, in particular, provides a thorough *Theory of Language* that integrates aspects of critical theory, anthropology, sociology, and psycho-linguistic analysis to connect discursive exchanges to social realities. His approach allows for educational researchers to accomplish this by first asking them to identify discursive patterns via a language analysis anchored in his *Seven Building Tasks* which then provide the foundation for making theoretical connections to a larger social reality via his *Theoretical Tools of Inquiry* (Gee, 2004, 2008).

Following this schematic, the first stage of the critical discourse analysis for this dissertation applied an analysis of Gee's (2004) Seven Building Tasks to themes derived from tagged, archival data from the CIDI course. As proposed by Rogers (2004) to educational researchers engaging in *critical discourse analysis*, I anchored this stage with Braun and Clarke's (2006) six-phase model for thematic analysis to identify themes that emerged from archival data tagged with Gee's (2004, 2008) Seven Building Tasks. From this stage, I was able to identify seven major themes that arose from the archival data: *Positioning, Expectations, Ability to Contribute, Leadership, Design Expertise, Engagement, and Team Dynamics*. As part of the presentation of the findings for the first stage of the analysis, each theme was analyzed via Gee's (2004, 2008) Building Tasks, detailed, and relevant examples from the archival data to illustrate the building task combinations from which these patterns derived were provided (Braun & Clarke, 2006; Corbin & Strauss, 2008; Rubin & Rubin, 2012).

These patterns offer the foundations for the second stage of the critical discourse analysis by providing insight into the primary power imbalances associated with the CIDI course. These imbalances stem primarily from a disciplinary-based alignment or misalignment with regards to the contexts interdisciplinary teams were navigating in the course (via their positioning, expectations, and ability to contribute). Regarding knowledge construction in this space, these patterns underscored that such interaction was dependent on how well students could supersede such imbalances (i.e., team dynamics). A few methods utilized for these types of endeavors include: teaching one another, a proclivity to think outside of their disciplinary norms, and the willingness to grasp deeper understandings from their interdisciplinary interactions (via leadership strategies, design expertise, and engagement).

In the second stage of the critical discourse analysis, Gee's (2004, 2008) Theoretical Tools of Inquiry were applied to the discursive patterns found in stage one. Through this effort, the themes derived from the CIDI course archival data were further defined as aspects of the *Discourses, situated meanings, social languages and cultural models* inherent within the contextual framework (Gee, 2004, 2008). The purpose of this analysis was to utilize theory to describe how the Building Tasks utilized by students in their discursive patterns are indicative of larger, societal influences that influenced their interactions throughout the course (Gee, 2004, 2008; Rogers, 2004). Aligned with the research questions for this dissertation, two items anchored this discussion: the manifestation of power in students' reflections of their experiences and the construction of knowledge regarding their prototype design.

By employing Gee's (2004, 2008) approach to *critical discourse analysis*, I was effectively able to explore the discursive patterns (via the themes identified) utilized by students to reflect on their experiences and observations within the CIDI course to describe how power

manifests within such an environment and what its role is in knowledge construction.

Ultimately, power was inherently determined by the way in which students perceived that their strongest identity marker within the course (i.e., the nursing or engineering discipline) aligned to the environment in which they were interacting. Nursing students tended to reflect that their disciplinary marker was more aligned with the clinical immersion setting, wherein the engineering students tended to reflect that their disciplinary marker was more aligned with the design spaces. It was observed, for example, that the Significance, Connections, and Politics Building Tasks became more prominent when students' could talk in more depth about a space in which they felt they were more familiar or they perceived that their prior knowledge carried weight (Gee, 2004, 2008).

Further, this perceived advantage impacted the relationships that resulted between students and between students and their learning space; for instance, a relationship of dependence on another student's previous knowledge and experience in a space may have led to a decreased level of interaction between that student and the space in general (e.g., the sub-theme of Dependence). This tended to be the case in a large number of engineering students' reflections of their experiences in the clinical immersion and, conversely, the nursing students' reflections of their experiences in the design space. Through the examples encompassed in the Ability to Contribute theme it became evident that when students' disciplinary markers were perceived to hold less significance within a particular setting in the CIDI course, it became more difficult for them to contribute to their group's interaction in a way that advanced their overall group project and knowledge construction efforts. Effectively, this misalignment between students' disciplinary markers (i.e., perceived cultural model) and the space in which they were interacting (i.e., perceived Discourses, social languages, and situated meanings) either

empowered them to be active agents or rendered them silent observers within that space (Barker, 2012; Foucault, 1980, 1982; Gee, 2004, 2008, 2011).

These types of power manifestations subsequently influenced how students' perceived their groups' progress towards the objective of knowledge construction as encompassed by an innovative prototype design (Arce et al., 2015; Sanders & Geist, 2016). Students that reflected positive learning experiences in their group (as encompassed in the Team Dynamics theme) also emphasized the importance of teaching and embracing flexible learning attitudes. This observation is important to note as such elements permitted students to move outside of their original disciplinary cultural model and learn new, common, social languages that helped them to create a shared Discourse associated with the CIDI course (Gee, 2004, 2008). One example of this dynamic includes excerpts of engineering students that emphasized that their nursing peers' role in teaching them the social languages associated with the clinical immersion setting was vital to helping them be more readily able to discuss design related processes in that space (Gee, 2004, 2008; Sanders & Geist, 2016). Additionally, another example of this dynamic highlighted excerpts of nursing students that acknowledged a willingness to learn design concepts and modeling software from their engineering peers in order to be able to contribute to the problem solving aspects of the prototype design (Arce et al., 2015; Sanders & Geist, 2016).

The findings from this stage of the critical discourse analysis emphasized that the manifestation of power and its influence on knowledge construction was primarily accomplished via students' association with a specific disciplinary cultural model (i.e., nursing or engineering) (Gee, 2004, 2008). Moreover, the affiliation to a specific disciplinary cultural model determined several of the ways in which students engaged within particular social contexts embedded within the CIDI course (Gee, 2004, 2008; Sanders & Geist, 2016). This expressed alignment impacted

the way students recalled their experiences in the following ways: how they positioned themselves (as either insiders or outsiders within that space); their expectations regarding how they understood that space and made situated meanings (as either aligned or unaligned); and ultimately, their perceived ability to contribute within that space based on their fluency of the associated social language or Discourses (as either a sense of dependence or being overwhelmed).

Thus, albeit the purpose of the course was to provide students a forum in which to engage in transformative dialogue in an area that overlapped both the nursing and engineering disciplines (i.e., healthcare), the alignment of disciplinary cultural models to specific social contexts within the course subsequently provided students unintended leverage at different points in the semester (Sanders & Geist, 2016). Such leverage permitted students the ability to build on the social languages and Discourses they already understood within a certain environment or an advantage in making complex situated meanings in an environment aligned with their disciplinary cultural model (Gee, 2004, 2008). Nevertheless, student teams that were able to accomplish the objectives of the course by learning from one another's disciplinary cultural models and thus expand their own perspectives were better able to communicate and navigate complex settings (Gee, 2004, 2008). Where such overlap in their respective cultural models allowed them to create new social languages and Discourses associated with the CIDI course and healthcare in general, students became empowered to derive situated meanings relevant to their group's prototype design: in effect, new knowledge construction (Arce et al., 2015; Gee, 2004, 2008; Sanders & Geist, 2016).

A Cultural Studies Project

Power – which holds the potential to empower or silence students - is intrinsic in social interaction and therefore inherent in collaboration (Barker, 2012; Thayer-Bacon, 2000). In any

collaborative learning space at the undergraduate level, power will therefore inevitably influence students' engagement with or withdrawal from complex conversations (Foucault, 1980; Mills, 1997; Shapiro & Permuth, 2013). As noted in chapter one, exploring how power influences new knowledge construction in undergraduate collaborative learning environments has the potential to uncover what type of interactions are valued and integrated or marginalized and excluded as part of these communicative exchanges (Hytten, 1997; Mills, 1997; Thayer-Bacon, 2003). Understanding power and how it permeates within social interaction is thus paramount for educators interested in promoting a purposefully interactive learning space (Anderson, 2013; Brooks, 2013). As issues of power are little addressed in pedagogical manuals on teaching and learning practices geared towards facilitating collaboration at the undergraduate level, I provide this dissertation as a way to address this gap, advance cultural studies scholarship in this area, and help improve collaborative learning techniques at the undergraduate level (Barkley, Cross, & Major, 2005; Brooks, 2013; Felder & Brent, 2015; Lee, 2004; Summerfield & Smith, 2011).

When applied to an educational context, cultural studies provides a space in which to challenge and better pedagogical strategies through the study of underlying power dynamics (Anderson, 2013; Barker, 2012). As a cultural studies project, this dissertation provides valuable insight with regards to the manifestation of power and its impact on collaboration and knowledge construction in an interdisciplinary environment at the undergraduate level. Although derived from a specific contextual framework defined by the CIDI course, such points present interesting aspects related to interdisciplinary collaboration in general which offer educators a better understanding of student interaction within this type of learning space. In the following, I offer a discussion that underscores the main takeaways stemming from the primary findings from this dissertation. Here I highlight how manifestations of power impacted the context of the CIDI

course in three ways: through space, language, and disciplinary beliefs. Utilizing a cultural studies lens, scholarship from this field of study is integrated to emphasize the consequences of power dynamics inherent in interdisciplinary, collaborative spaces.

Space, Power, and Knowledge Construction

Utilizing Gee's (2004, 2011) approach to *critical discourse analysis*, the findings from this dissertation indicate that students in the CIDI course predominantly related to a particular disciplinary marker that determined the lens by which they understood and navigated the social contexts presented in the course. These disciplinary markers were evident in the Identity Building Tasks that students employed to frame their understanding of various experiences or observations from the CIDI course (e.g., "as a nurse" or "as an engineer") (Gee, 2004, 2008). As noted in the aforementioned summary of the findings, this type of framing also provided students with a level of perceived leverage in particular settings, which consequently defined their ability to engage with the resources and individuals representative of that space (Gee, 2004, 2008). *The key takeaway is: the setting of the learning environment matters as it will provide indicators of how students perceive what type of knowledge is valued in that context and thus the power dynamics generated in that space.*

Cultural studies work has historically underscored the connection between power, discourse, subjectivity, and space (Anderson, 2010; Bourdieu, 1973; Crampton & Elden, 2007; Giroux, 1997; Foucault, 1993, 2007). In particular, scholars have denoted that because contexts are socially constructed, they are reflective of the power struggles, discursive conflicts, and political strategies that define what types of individuals hold the advantage within that space (Anderson, 2010; Apple, 1996; Bourdieu, 1973; Richardson & Jensen, 2002). To further this point, Flyvberg and Richardson (1998) posit:

Spaces, then, may be constructed in different ways by different people, through power struggles and conflicts of interest. This idea that spaces are socially constructed, and that many spaces may co-exist within the same physical space is an important one. It suggests the need to analyze how discourses and strategies of inclusion and exclusion are connected with particular spaces (pp. 9-10). (as cited in Richardson & Jensen, 2003, p. 7)

These strategies of inclusion and exclusion inform the level of participation and engagement of individuals in relation to one another within specific spaces (Anderson, 2010; Literat, 2016; Richardson & Jensen, 2003). According to Literat (2016), the level of participation dependent on these power struggles can be described on a spectrum of power distribution in that space, with more concentration of power decreasing participation and more equal distribution of power increasing participation. The nature of identity and participation in social spaces can also be linked to the politics of representation: who gets to be at the center of these dynamics, whose knowledge is valued, and who is placed at the margin (Barker, 2012; Hall 1996; Lim, 2014).

As educators, this link between politics, space, and identity is important in order to facilitate collaboration, particularly if it is interdisciplinary in nature. The prevalence of preconceived notions permeating students' abilities to interact are intertwined within the context in which they work (Foucault & Nazzaro, 1972; Hall, 1996; Literat, 2016). As students do not enter into social interactions without pre-conceived notions regarding the validity of knowledge, these struggles will determine the politics of representation in relation to one another and the chances of constructing new knowledge in that space (Barker, 2012; Fredrickson, Dunlap, & McMahan, 2013; Hall, 1996; Literat, 2016; Narayan, Rodriguez, Araujo, Shaqlaih, & Moss, 2013). The archival data from the CIDI course exposed the predominance of a disciplinary

identity marker with regards to the student population represented; however, this does not implicate that such markers are universally prevalent, as other identity markers (e.g., race, gender, ethnicity, socio-economic status) could be dominant in other settings, dictating the cultural model which best facilitates navigation in that space (Barker, 2012; Hall, 1996; Literat, 2016; Richardson & Jensen, 2003). As Gee (2004, 2011) would contend, several Discourses influence how we interpret our world with the primary one in flux as relevancy and other Discourses change its congruency in diverse spaces.

What this discussion offers educators is that when it comes to developing novel curricula we must remember Apple's (1996) advice with regards to learning, space, and pedagogy: "...let us not be romantic" (p. 108). In the ideal world, the distribution of power and the politics of representation in novel and unique learning spaces will be evenly distributed so that all students may have the opportunity to contribute to the conversation (Apple, 1996; Greene, 1993; Thayer-Bacon, 1998). As more postsecondary initiatives motivate the design of new courses that incorporate experiential learning and participation in various settings, the distribution of power may not be even or consistent for all students at different points in the duration of the course (Apple, 1996; Berger et al., 2016; Literat, 2016). Therefore, let us not be swept away by the enthusiasm of the current postsecondary focus on creative and critical thinking initiatives and believe that just because students with similar interests are placed together for the sake of learning, knowledge construction will in actuality occur (Berger et al., 2011; Brooks, 2013; Paulus & Nijstad, 2003; Shapiro, 2013; Shapiro & Permuth, 2013). Regardless of efforts to provide collaborative learning environments that are theoretically free of such constraints, students will react to different environments in ways in which we, as educators, cannot necessarily fathom or anticipate (Bransford, Brown, & Cocking, 1999; Lee, 2004; Shapiro &

Permuth, 2013). In such cases, students who find themselves at the short end of the power distribution spectrum will be unintentionally silenced in these otherwise exciting learning spaces (Literat, 2016).

As educators work to build novel, collaborative learning environments like the CIDI course, let us learn from these purposeful pedagogical experiments to help us be cognizant of the social constructs that may empower or hinder how students navigate social spaces (Bransford et al., 1999; Crampton & Elden, 2007; Fredrickson et al., 2013; Narayan et al., 2013). Within the specific contextual framework of the CIDI course, students' repetitive uses of Building Tasks associated with their discipline became indicative that the pre-conceived notions they carried into either the clinical immersion or design settings of the course were rooted in perceptions regarding the value of their disciplinary knowledge within that space (Gee, 2004, 2008). For nursing students, their disciplinary knowledge was perceived as more valuable in the clinical settings wherein for engineering students such knowledge was perceived as more valuable in the design settings. As this was not necessarily the intention of the design of the course, such power dynamics are important to note for the aforementioned reasons relating to participation (Literat, 2016; Richardson & Jensen, 2003; Sanders & Geist, 2016). Arguably, other social identity markers could be filtering the disciplinary cultural models students reflected on in the archival data (e.g., as a female engineer, as a male nurse), however their language relayed a heavy emphasis on discipline based markers which, undoubtedly, was influenced by the interdisciplinary emphasis of the course (Gee, 2004, 2008; Sanders & Geist, 2016). Congruent to Hall's (1996) description of the politics of representation, the context and the purpose of the CIDI course ultimately dictated what type of knowledge was perceived as valuable, at what point in the semester, and during what aspect of the design process.

It is also pertinent to emphasize the positive pedagogical aspects that helped to address these imbalances. Within the design of the CIDI course the pedagogical purpose was to develop transformative dialogue between students through the exposure of commonalities shared by both the nursing and engineering disciplines as they converged on the area of healthcare (National Academy of Science [NAS], 2014; National Research Council [NRC], 2009a, 2009b; Sanders & Geist, 2016). As noted within the findings, when students were able to effectively communicate as a group, they reflected on the value of the common ground elements (through either the design or healthcare commonalities) developed within the course. For example, one excerpt in the findings displayed how differing disciplinary lenses influenced students' initial design expertise: wherein the nursing student understood a particular situation through the lens of patient care and biology, their engineering counterpart understood the same situation through the lens of systems and hydraulics. In sharing this knowledge and comprehending how the same scenario could be viewed in different ways, the phantasmagorical boundaries of the disciplinary cultural models that these students aligned themselves with expanded (Gee, 2004, 2008; Sanders & Geist, 2016). In instances where this type of interaction occurred, students did note that they came away from the experience with a better appreciation of each other's disciplines and the ways it can be applied to healthcare. This type of illustration displays the permeability of the power of representation within varying social contexts (Barker, 2012; Hall, 1996). When spaces adequately provide students representing disparate subjectivities a chance to reconstruct a common social reality, the power dynamics are leveraged to facilitate growth and interaction (Gee, 2004, 2008; Hall, 1996; Literat, 2016).

However, in some instance, the politics of representation favored no student (Barker, 2012; Hall, 1996). This became the case when, for example, nursing students reflected on

instances in the clinical settings where they were deluged with ideas for problem identification that they became too overwhelmed to help their engineering peers decipher the social languages associated with that space (Gee, 2004, 2008). Within the design settings, this was illustrated when engineering students reflected on experiences where the social language associated with a particular modeling software or printing equipment was too advanced for them to decipher and teach such a language to their nursing peers (Gee, 2004, 2008). In these scenarios, students were unable to navigate the social context regardless of their perceived advantages; the official holders of knowledge (e.g., experts in the modeling software, professors, nursing staff) tipped the balance of the power dynamics to hinder students' abilities to contribute (Gee, 2004, 2008; Lim, 2014; Literat, 2016; Richardson & Jensen, 2003). This type of imbalance consequently impacted the entire group's ability to generate new ideas, contribute to design processes, and effectively construct knowledge (Anderson, 2013; Brooks, 2013; Sanders & Geist, 2016).

The critical point then lies with one of the main objectives of this dissertation: to understand how power influences the interactions between students as they attempt to construct new knowledge through these exchanges. With regards to pedagogy and learning it can then be understood that power, derived from disciplinary based affiliations in the context of the CIDI course, mitigates not only what type of knowledge is privileged in these interactions but the level of agency students believe to have to contribute to transformative conversations (Bourdieu, 1973; Crampton & Elden, 2007; Foucault & Nazzaro, 1982; Literat, 2016; Sanders & Geist, 2016; Smith & Macgregor, 1992). Although it is obvious that students will feel more comfortable contributing to the conversation within a space that is more familiar to them, if the point of the course is to have *all* students contribute to the conversation with the intention of building upon one another's ideas, then pedagogically, such imbalances need to be addressed

(Anderson, 2013; Berger et al., 2016; Brooks, 2013; Bruffee, 1993, 1995; Hall, 1996; Literat, 2016; Shapiro, 2013). Within a constructivist environment founded on learning through social interaction (like that of CIDI course) this is important to note because if students become more than their discipline, if they become unchained to the Discourses and social languages that dictate how they *should* act within certain spaces, then perhaps they will be given the opportunity to explore new avenues of thought within any space, regardless of disciplinary affiliation (Berger et al., 2011; Bruffee, 1993, 1995; Greene, 1993; Hall, 1996; Literat, 2016).

Communication, Power, and Knowledge Construction

It matters significantly if a nursing student reflects on the belief that they feel that their engineering peers are “the smart ones” of the group or if an engineering student reflects on the belief that their nursing peers are “the empathetic ones” of the group (Foucault, 1977, 1980; Hall, 1996). It matters because, as underscored by Foucault (1977, 1982), power is intrinsically intertwined in discourse and makes humans into subjects of repeated, discursive practices. Foucault (1982) furthers that power has the ability to categorize and mark individuals by imposing a “law of truth” on which those individuals are continually socially recognized (p. 781). If nursing students repeatedly argue that their engineering peers are truly the “smart ones,” there is an inevitable risk of a self-fulfilling prophecy in which these students become subjects to this discursive scrutiny; the same is true for engineering students who continually contend that they are not the “empathetic ones” (Foucault, 1982, 1977; Hall, 1996, 2000). Students influenced by such discourse can potentially embody the norms associated with the language representative of these power dynamics that they stop short of reaching their full potential (Foucault, 1977, 1980; Mills, 1997). In holding more or less perceived advantage within specific spaces and communicating the acknowledgement of such political sway, discourse then shapes the social realities of these students through their interaction and what is being indicated in these

exchanges (Foucault, 1977; 1980; Mills, 1997; Thayer-Bacon, 2003). *The key takeaway is: how students communicate with one another or about one another will inform their relationship within and to that learning environment.*

Building on what was presented of her work in chapter two, Thayer-Bacon's contributions to understanding the construction of knowledge are re-incorporated into this discussion as it relates to how nursing and engineering students talked to and about one another. As a cultural studies scholar, her work on *relational (e)pistemologies* and *relational ontologies* draws attention to power asymmetries with regards to language and how knowledge is socially constructed (Thayer-Bacon, 2003, 2017). For Thayer-Bacon (2003), "*My relational (e)pistemology views knowing as something that is socially constructed by embedded, embodied people who are in relation with each other*" (emphasis in original, p. 10). The ideas that we construct as part of the connections and negotiations we make within our communities therefore not only help us to continue to grow as learners, but challenge us to acknowledge our own embeddedness regarding the knowledge we construct (Thayer-Bacon, 2003). Our own sense of self and the contextuality within which we understand our social world is furthered by interactions with others and sustainable, trusting relationships (Thayer-Bacon, 2003). We thus require one another to escape this embeddedness through the exposure to other worlds; but this is only possible through communication and open, transformative discussions (Thayer-Bacon, 2003, 2010, 2017). An interdisciplinary relationship in which individuals hold more power over their counterparts in one context than another may therefore not promote the trust and open communication needed to achieve such insight (Thayer-Bacon, 2000, 2003). Within such imbalanced relationships, students' sense of self will reflect what their peers communicate: they are either the smart (or in contrast the non-intelligent) ones or the empathetic (or in contrast the

non-empathetic) ones (Thayer-Bacon, 2000, 2003).

As part of her argument for *relational ontologies*, she furthers that if the world is conceptualized as one of multiple truths and we acknowledge that we are confined to view the world through certain lenses (via our embeddedness within specific socio-cultural, historical contexts), then we must submit that our descriptions of the world are fundamentally limited (Thayer-Bacon, 2017). Such limitations are inherently due to the epistemological and ontological beliefs that inform the way we understand part of an ever-evolving universe (Thayer-Bacon, 2017). Utilizing a fishing net metaphor, she describes our epistemological beliefs as weft threads and our ontological beliefs as warp threads that comprise the net with which we delve into a vast, ever flowing ocean of knowledge (Thayer-Bacon, 2017). We are indeed limited by this net, but we can also make it wider by continually incorporating new threads into the body (Thayer-Bacon, 2017).

As both engineering and nursing students are familiar with the Discourses associated with their profession prior to enrolling in the CIDI course, such additional exposure to these Discourses re-emphasizes the values, norms, and knowledge that they must possess to embody their particular disciplinary marker (Barker, 2012; Gee, 2004, 2008; Hall, 1996, 2000; Mills, 1997). Their sense of self within these contexts is then further enforced by peers who embody foreign disciplinary markers and communicate distinctions that emphasize a mutual embeddedness within a specific academic discipline (Thayer-Bacon, 2003). If trust is not established between students in their interdisciplinary groups such that these conversations foster growth, the fear is that students may come to believe they must align with *only* those Discourses relevant to their disciplinary markers in order to be taken seriously (Gee, 2004, 2008; Foucault, 1982; Hall, 1996, 2000; Thayer-Bacon, 2003). In effect, they become reproducers of the same

type of Discourses associated with their discipline instead of thoughtful contributors to new conversations (Foucault, 1982; Gee, 2004, 2008; Hall, 1996, 2000; Thayer-Bacon, 2003). This was the case, for instance, for the engineers who reflected on a hesitation and a resistance concerning interaction with the patients or nursing staff in the clinical immersion setting or the nursing students who reflected on the modeling or design aspects of the course as being “above their pay grade”. For an interdisciplinary course centered on knowledge construction through social interaction, having students silo themselves into these roles is not necessarily beneficial.

However, as noted in the previous section, this was not necessarily the norm in all interdisciplinary groups as represented by the CIDI course archival data. For some groups, continual interaction resulted in the creation of a new Discourse which integrated design expertise and healthcare information into their dominant disciplinary framework (Gee, 2004, 2008). Arguably, these were the same groups that indicated higher levels of confidence in their ability to communicate with one another. Connecting back to Thayer-Bacon’s (2017) fishing net metaphor, such groups were able to incorporate new threads representative of these relevant and overlapping academic fields which helped them to expand their fishing nets as they cast them into the social contexts incorporated into the CIDI course. Regarding knowledge construction, this suggests that if all students are able to embody a social marker relevant to all social contexts (i.e., an expanded fishing net), instead of through association via a disciplinary marker (i.e., a smaller fishing net), then perhaps more trust will develop between them resulting in increased ideation within their exchanges (Cross, 2006; Hanington & Martin, 2012; Thayer-Bacon, 2017).

As we are limited to the archival data presented in this dissertation, it is not fair to say that such level of interaction did not occur in this course as the students did create incredibly novel prototypes of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). However,

based on their reflections of their experiences in the course, it was evident that at some moments in the course students were arguably thinking more within the lines of their disciplinary cultural model than as designers or healthcare professionals which could inhibit the production of ideation regarding design (Cross, 2006, 2011; Jonassen, 2011). Changing the Discourses for these students through the language they utilize in these spaces is therefore important as it inescapably portrays meaning that influences how students construct their understanding of their value in certain spaces and in relation to one another (Foucault, 1982; Thayer-Bacon, 2003). As Thayer-Bacon (2000, 2003) suggests, trusting relationships are fundamental to producing knowledge construction through social interaction. Through communication and trust, once students understand their contextuality in relation to one another and the spaces they navigate, the better able they will be to integrate new threads into their fishing net and offer fresh insight from their own, embedded perspectives (Thayer-Bacon, 2000, 2003, 2017).

Power, Knowledge, and Interdisciplinary Collaboration

Much of the success of collaborative learning environments falls on the degree to which students can engage with and navigate the conflict and active dissent necessary to construct new knowledge (Anderson, 2013; Barkley et al., 2005; Bruffee, 1993, 1995; Felder & Brent, 2015; Fredrickson et al., 2013). To further this point, Anderson (2013) argues that collaboration, “requires creating an environment for transformative dialogue in which newness occurs,” making the construction of new knowledge the primary objective (p. 515). However, due to the embeddedness of disciplinary norms, expectations, and values, interdisciplinary collaborative work is often fraught with power dynamics that dictate what type of knowledge is valuable and therefore the type of conflict that arises (Campbell, 2005; Derry, Gernsbacher, & Schunn, 2005). Instead of being constructive and innovative, such dissent often focuses on the differences

inherent between disciplinary beliefs and is not with dismissal (Bozeman & Youtie, 2017; Campbell, 2005; Derry et al., 2005; Paulus & Nijstad, 2003). The strategies students use in interdisciplinary collaborative spaces geared towards knowledge construction must therefore facilitate constructive communication among dissenting voices; such dialogue will help digest and analyze dissimilar ideas rather than critique and disregard them (Bozeman & Youtie, 2017; Brooks, 2013; Fredrickson et al., 2013; Shapiro, 2013). *The key takeaway is: power dynamics are also embedded in disciplinary norms, values, and beliefs which influence how students interact with one another in an interdisciplinary space and the degree to which such interaction leads to the creation of new knowledge.*

If we turn back to the literature presented in the earlier chapters of this dissertation, the link between knowledge construction and collaboration is well established (Anderson, 2013; Brooks, 2013; Paulus & Nijstad, 2003; Milliken et al., 2003; Thayer-Bacon, 2000). Educational scholarship underscores that the level of effectiveness (often defined as the quantity and quality of innovative ideas) of collaborative learning environments is dependent on students' ability to communicate with one another (National Academy of Engineering [NAE], 2005, 2010; Paulus & Nijstad, 2003; van Rijinsoever & Hessels, 2010). Moreover, in order for these communicative strategies to work, students must be equipped with the socio-emotional intelligence and skills necessary to navigate the power dynamics inherent in complex social context to be able to contribute their voice to an often challenging conversation (Paulus & Nijstad, 2003; Thayer-Bacon, 2003, 2010). As noted by several scholars, these types of skills are often overlooked and underdeveloped, resulting in the fact that not all students walk into classrooms equipped with the communicative tools necessary to contribute to, let alone commence, the dialogue created in

such spaces (hooks, 1993, 1994; Hytten, 1997; Giroux, 1997; Noddings, 1995; Thayer-Bacon, 2000, 2003).

In the case of the students who were enrolled as part of the CIDI course in the semester in which this archival data was collected, their reflections provide an avenue with which to understand what type of communicative exchanges they were engaged in throughout the course. Arguably, as these students were upper level students in their respective disciplines (some with additional external experiences that helped them better navigate certain social contexts) they were equipped to a certain degree in communicative strategies relevant for collaborative work as characterized by their discipline. One engineering student even suggested as much when they mentioned that they understood the social languages necessary to communicate with other engineers but not nurses. However, as noted from the findings of the critical discourse analysis conducted for this dissertation, there were certain settings in which one discipline was more aligned with the social context than the other. In these settings, the communicative strategies necessary to generate new knowledge were replaced by communicative strategies aimed at explaining, teaching, or facilitating understanding (Barkley et al., 2005; Bruffee, 1993, 1995; Felder & Brent, 2015; Fredrickson et al., 2013). Although this is certainly an aspect of collaborative work, Derry and colleagues (2005) argue that interdisciplinary, collaborative dialogue, at its best, should be transformative in that it engages participants in debate, conflict, and convergence resulting in, “new knowledge, new solutions, and even new disciplines that would not be possible without such dialogue” (p. xii).

This notion links back to the idea that disciplinary social markers are subject to the influence of the power dynamics hitherto outlined in this dissertation (Barker, 2012; Hall, 1996; Giroux, 1997). Within this framework, power is intertwined with collaborative learning in that it

is associated with the perception of who can hold, generate, and understand knowledge based on standards offered by disciplinary traditions and, in turn, what type of knowledge is worthy of knowing and reproducing (Bourdieu, 1973; Bransford et al., 1999; Crampton & Elden, 2007; Foucault, 1977; Giroux, 1997; Hall, 1996; Lim, 2014). Applied to interdisciplinary, collaborative learning environments (e.g. the CIDI course), this idea could shed light on the struggles students' faced to go outside of their comfort zone; that is, if particular social languages and Discourses were favored, then potentially new interpretations or versions of these same elements might not necessarily be valued (Apple, 1997; Gee, 2004, 2008; Giroux, 1997). Although students were willing to learn from one another, this tended to be limited to the aforementioned communicative exchanges that aimed to introduce students to new Discourses but not necessarily create new ones (Anderson, 2013; Brooks, 2013; Bruffee, 1993, 1995; Gee, 2004, 2008). Effectively, students were teaching one another knowledge that was deemed valuable as determined by their preconceived disciplinary norms and beliefs versus engaging in transformative dialogue (Anderson, 2013; Bruffee, 1993; Campbell, 2005; Derry et al., 2005; Giroux, 1997; Thompson Klein, 2005).

Campbell (2005) offers more insight into this notion when he describes one of the central factors influencing the effectivity of interdisciplinary work in the "ethnocentrism of disciplines" (p. 3). This concept describes a certain degree of "tribalism or nationalism" that comes from the association of socially derived contextual, academic markers as bestowed by academic disciplinary boundaries, university departments, and national scientific organizations, among others (Campbell, 2005, p. 3). This sense of bounded, disciplinary ethnocentrism is anchored in a false, unrealistic conceptualization of unidisciplinary competence – that scholars are experts in the totality of one discipline when, in actuality, they are mere specialists within a narrow

spectrum of one portion of an entire body of knowledge (Campbell, 2005). When interacting with others that believe that their notion of the world is *the* perspective from which all understanding must derive, then interdisciplinary work becomes ineffective: no new knowledge is created as the interactions are not transformative, but rather informative and characterized by non-productive critiques and conflict (Campbell, 2005).

For new knowledge construction to occur, then, students from both disciplines must be sufficiently versed in a common language that facilitates their ability to transcend existing conceptual cultural models to create new cultural models (Anderson, 2013; Bruffee, 1993, 1995; Gee, 2004, 2008; Hall et al., 2012; Rosenfield, 1992; Tuori & Vilen, 2011). Students must be unconstrained to become “border-crossers” or students who embody a multi-faceted form of thinking in that they embrace differences and seek to move continuously through physical, cultural, and social borders in an effort to expand their own understanding (Giroux, 1997, p. 96). Towards this point, Paulus and Nijstad (2003) emphasize that the effective integration of diversity within collaboration is paramount, suggesting that:

In fact, if it were not for diversity, there would be no point in creative collaboration – why would we bring people together if they take the same approach to a problem, have the same opinion, the same ideas, or the same solutions? (p. 328)

In the same manner, it could be argued that when students are not contributing to the conversation regarding design within any given space, due to unintentional social, historical, or disciplinary based borders, then the point of the collaborative effort is missed (Bozeman &

Youtie, 2017; Bruffee, 1993, 1995; Giroux, 1997; Hall, Stevens, & Torralba, 2005; Hall et al., 2012; Paulus & Nijstad, 2003).

According to Hall and colleagues (2012) scholarship focused on collaborative learning practices and strategies outline three different types of cross-disciplinary collaboration: multidisciplinary, interdisciplinary, and transdisciplinary. The least integrative of these three types of collaboration is considered multi-disciplinary, as individuals continue to be conceptually anchored within their own discipline (e.g., a disciplinary cultural model) (Hall et al., 2012; Rosenfield, 1992). The most integrative and innovative of these is considered transdisciplinary, wherein individuals actively and willingly expand the bounds of their own discipline (i.e., transcend) by integrating and extending their perspective through contributing perspectives (Hall et al., 2012; Rosenfield, 1992). When a shared conceptual framework (i.e., cultural model) is created through these exchanges, innovative ideas in the form of new knowledge creation occur (Hall et al., 2012; Paulus & Nijstad, 2003; Rosenfield, 1992). At the interim is interdisciplinary collaboration, wherein individuals may exchange diverse perspectives and expand their own disciplinary perspective to an extent, but a new, shared conceptual framework is not effectively created in the exchange (Barkley et al., 2003; Bruffee, 1993, 1995; Hall et al., 1992).

Although intentionally interdisciplinary, the objective of the CIDI course was arguably more aligned with a transdisciplinary perspective in that students were asked to create something innovative within a shared, overlapping field (Arce et al., 2015; Hall et al., 2013; Papert, 1980; Rosenfield, 1992; Sanders & Geist, 2016). Their exchanges within their group context were meant to engender a type of transdisciplinary communicative practice – which includes dissent, convergence, and construction – that actively progressed towards an innovative prototype (Arce et al., 2015; Papert, 1980; Sanders & Geist, 2016). It can be argued that as all teams did create a

prototype of innovative technology at the end of the course, they did indeed engage in varying degrees of transdisciplinary or border-crossing exchanges (Arce et al., 2015; Giroux, 1997; Sanders & Geist, 2016). However, allied with this same notion, it can also be argued that in order to increase the level of effectiveness of these exchanges, students should be allowed more time to unpack the power dynamics associated with their discipline in order to transcend disciplinary boundaries rather than exchange and understand the differences of the knowledge valued by their disciplines (i.e., interdisciplinary exchanges) (Bozeman & Youtie, 2017; Bransford et al., 1999; Derry et al., 2005; Giroux, 1997; Hall et al., 2012; Tuori & Vilen, 2011).

Implications for Pedagogy

One of the primary objectives of this dissertation was to understand the pedagogical implications derived from exploring the power dynamics inherent within interdisciplinary, collaborative learning environments. The intention was that through this work strategies would be identified that help students to better their interaction with one another and address power imbalances that may be hindering such interaction. Although this dissertation was specific to the contextual framework provided by the CIDI course, such implications are not necessarily limited to this context (Corbin & Strauss, 2008; Rubin & Rubin, 2012). Student interactions in collaborative learning environments at the undergraduate level will always be influenced by power dynamics inherent in social interaction (Anderson, 2013; Barker, 2012; Lee, 2004; Shapiro & Permuth, 2013). Building off of the key takeaways derived from the findings of this dissertation, the following section is a presentation of five pedagogical implications that could help address power imbalances in interdisciplinary, collaborative learning spaces and facilitate new knowledge construction.

Developing New Cultural Models

Students do not leave their perspectives and experiences at the door – they enter and engage with others through a myriad of acquired social lenses (i.e., cultural models) (Fredrickson et al., 2013; Gee, 2004, 2008; Harvey, 2013; Kirn et al., 2016; Narayan et al., 2013). Therefore, I argue that if the ultimate purpose of an interdisciplinary, collaborative course is for students to engage in transdisciplinary discourse with the intention of constructing new forms of knowledge, then they must learn to work outside of their preconceived lenses (i.e., cultural models) in order to build new, shared lenses (Gee, 2004, 2008; Hall et al, 2012; Rosenfield, 1992). *The overall implication is: Within any undergraduate, interdisciplinary, collaborative course it would be beneficial for students to first understand their own social embeddedness in order to be able to re-orient their framework and create shared dialogue that provides a foundation for new knowledge construction (Anderson, 2013; Hall et al., 2005; Hall et al., 2012; Greene, 1997; Rosenfield, 1992; Thayer-Bacon, 2003).*

Using the example of the CIDI course, it would be beneficial, for example, to expose students to the Discourses associated with what it means to be a designer versus a nurse or an engineer (Gee, 2004, 2008). This type of exposure could help students achieve a common ground wherein they weave aspects of their respective cultural models into a new cultural model that converges on elements associated with design (Gee, 2004, 2008). This might also help them to focus their exchanges specifically on design-centered dialogue that contributes to the progression of their prototype of innovative technology (Arce et al., 2015; Hall et al., 2005; Sanders & Geist, 2016). For instance, as designers, both nursing and engineering students might look at patients that they interact with in the hospital as clients whom their prototype design may benefit (Arce et al., 2015; Cross, 2006; Jonassen, 2011; Sanders & Geist, 2016). The questions

they might ask this patient may be more concerned with everyday use and design strategies for improvement instead of patient care or clinical understanding (e.g., “what do you consider user friendly” versus “how are you feeling today” questions) (Cross, 2006, 2011; Jonassen, 2011). In addition, if both nursing and engineering students begin to see the professionals at the MakerSpace as design consultants, they might engage in useful conversations centered on material selection, budget, and time restraints (e.g., “how *would* you design” versus “how *do* you design” questions). Ideally, if the cultural model guiding both nursing and engineering students was centered on design expertise instead of disciplinary markers, students from both disciplines may be able to supersede disciplinary limitations entering into any of the CIDI course settings (Gee, 2004, 2008).

Developing New Social Languages

Social contexts often promote communicative exchanges that are relevant and significant to and for that specific environment (Gee, 2004, 2008). As observed in the findings from this dissertation, if the cultural model being utilized is aligned with such a social context, then it is more probable that the students utilizing that cultural model will also be more familiar with the social languages being utilized in that space (Gee, 2004, 2008). Such an advantage allows students the capacity to expand their understanding of that specific cultural model via the ability to make situated meanings from new exchanges (Gee, 2004, 2008). At the same time, students whose cultural model is not aligned with such a space will be less able to form such unique conclusions (Gee, 2008). Therefore, I argue that if the purpose of an undergraduate, interdisciplinary, collaborative course is to create a space in which students can exchange transformative dialogue for the purpose of new knowledge construction, then they must be prepared to create a *new social language* that is relevant and familiar for this purpose (Gee,

2004, 2008). *The overall implication is: Within any undergraduate, interdisciplinary, collaborative course, it would be beneficial for students to be able to create new social languages that conform to a cultural model that embodies an understanding of shared perspectives (Gee, 2004, 2008; Hall et al., 2012; Rosenfield, 1992; Tuori & Vilen, 2011).*

This pedagogical implication is related to the development of a new cultural model but wherein this would delineate frames of reference, norms, or shared knowledge, a new social language would suggest the development of characteristics associated with the communicative tools (e.g., terminology, phrases) (Gee, 2004, 2008). Using the example of the CIDI course, if students were re-oriented to a design centered cultural model then, arguably, a social language that helped students to communicate within this new perspective would be beneficial (Gee, 2004, 2008). The formation of such a shared, social language might be facilitated through a lesson plan geared directly towards having students understand the Discourses associated with what it means to be a designer. In this lesson, students might be exposed to new vocabulary affiliated with this new cultural model (e.g., ill-structured, iterative brainstorming processes, divergent and convergent thinking, human-centeredness, wicked problem) that provides the foundation for the formation of a shared social language (Cross, 2006, 2011; Gee, 2004, 2008; Jonassen, 2011). As the faculty of the CIDI course already conduct initial lessons wherein they ask students to establish commonalities between their disciplines specifically as they converge on the field of healthcare, perhaps this lesson could be re-designed with the purpose of forming a new vocabulary structured around design expertise (Arce et al., 2015; Sanders & Geist, 2016). Then, ideally, when students enter into the varying social contexts encompassed by the CIDI course, their exchanges would be more centered on design expertise and their prototype design then

training one another on how to navigate foreign social languages affiliated with the nursing or engineering (Arce et al., 2015; Bruffee, 1993, 1995; Gee, 2004, 2008; Sanders & Geist, 2016).

Unpacking Expectations

If students are reflective of a myriad of socially constructed identity markers which help them to understand their immediate social context, it is almost certain that these same tools provide students with preconceived expectations of these varying environments (Barker, 2012; Fredrickson et al., 2013; Hall, 1996; Thayer-Bacon, 2003, 2017). Students who understand a space to be more aligned with what they are familiar with are more likely to interact with that space through meaningful activities and engaging communication (Anderson, 2013; Bransford et al., 1999; Hall, 1996; Shapiro, 2013; Thayer-Bacon, 2003). Preconceived expectations and the alignment of learning spaces to these expectations therefore have the impact of predetermining students' actions within a space if they are well understood, acknowledged, and integrated as part of the learning objective (Anderson, 2013; Bransford et al., 1999). *The overall implication is: Within any undergraduate, collaborative learning course exposing students to new, and sometimes unfamiliar environments, it would be beneficial to understand any preconceived expectations held regarding these contexts in an effort to help students better engage with those spaces (Anderson, 2013; Bransford et al., 1999; Shapiro, 2013).*

As with the previous implication, this one too is associated with students' inherent cultural models (Gee, 2004, 2008). However, with this implication the focus on preconceived expectations is more aligned with understanding students' anticipated excitement, anxiety, nervousness, or concern regarding particular social spaces. Once again taking the CIDI course as an example, as part of their requirements in the course students were exposed to a myriad of clinical immersion and design settings that were at times familiar and at other times foreign to

anything they had previously experienced (Sanders & Geist, 2016). In reflecting on their experiences within the CIDI course, students expressed that a particular setting met their expectations and subsequently intertwined positive feedback with regards to that experience; for example, nursing students entering into their first clinical immersion of the course tended to reflect an excitement and positive anticipation of the experience. At other times, students reflected that a particular setting was not aligned with their expectations and subsequently either felt uneasy or out of place; for example, engineering students who reflected on interacting with patients or the nursing staff for the first time and expressed sentiments associated with not being able to ask questions or feeling overwhelmed. In other scenarios, students were simply unable to process what they experienced with what they expected because everything was new for them.

Arguably, part of the innovation of the CIDI course is exposing students to new environments so that they might identify a challenge that is authentic to these contexts (Arce et al., 2015; Sanders & Geist, 2016). The debriefing sessions after the clinical immersion experiences were, in actuality, designed to help students navigate the newness of these spaces in addition to helping them prepare for future interactions with the space (Sanders & Geist, 2016). Therefore, such debriefing sessions are useful to help identify these preconceived student expectations and provide ways in which they could be addressed. For example, one way to achieve this might be to perform these sessions prior to students entering new environments instead of afterwards so that they may become aware of expectations that may hinder their ability to interact in these spaces. Additionally, instructors could provide students with specific activities that they might engage with in these spaces regardless of their expectations or cultural models (Gee, 2004, 2008). Perhaps by allowing students to reflect on these preconceived expectations prior to entering into these spaces (i.e., what I expect from my peers versus what I

expect from myself) in addition to anchoring students to a specific learning objective associated with the design aspect of the course (e.g., identify two potential challenges and ask a professional about these ideas) students will be able to productively navigate situations that are unfamiliar and potentially overwhelming.

Creating a Common Learning Space

Aligned with the notion of preconceived expectations is the intrinsic significance of certain social contexts to students' disciplinary cultural models (Gee, 2004, 2008; Goodwin, 2005). If a specific social context is more aligned with the cultural model with which students are affiliated, then the social languages and Discourses associated with that context will be familiar (Gee, 2004, 2008). This familiarity will facilitate students' ability to make situated meanings from the exchanges in these contexts (Gee, 2004, 2008). The social context in which students interact is therefore saturated with socially significant elements that determine the degree to which students engage within that space (Crampton & Elden, 2007; Gee, 2004; Goodwin, 2005; Richardson & Jensen, 2003; Rogers, 2004). In effect: the context in which students interact matters. *The overall implication is: Within any undergraduate, interdisciplinary, collaborative learning course instructors must be cognizant that the context in which students are working may favor some students over others and impact the overall power dynamics of student groups (Crampton & Elden, 2007; Derry et al., 2005; Goodwin, 2005; Literat, 2016; Richardson & Jensen, 2003).*

The argument here is similar to that made for addressing preconceived expectations. However, with this implication the focus is on the actual physical spaces that students interact with in the course. Once more taking the CIDI course as the focal example, whether it was a clinical immersion or a design setting, students' reflections denoted an affinity to one type of

environment over another based on their disciplinary identity marker (i.e., nursing or engineering). In these scenarios, depending on the context, one discipline was being empowered over the other to engage more with that space. It could be argued that the CIDI course may have been purposefully designed to empower one group of students over the other with the idea being to have students learn from one another in these spaces (Sanders & Geist, 2016). Nevertheless, if the overall learning objective was to become transdisciplinary and work towards new knowledge construction, then students should have a space that they share, throughout the semester, where - regardless of their discipline - they feel empowered to contribute to the development of the final prototype design (Arce et al., 2015; Hall et al., 2012; Literat, 2016; Rosenfield, 1992; Sanders & Geist, 2016). This imbalance could simply be addressed by having students meet weekly in a classroom space that is not associated with either discipline but rather with a new, shared cultural model (e.g., a classroom in the Arts and Science or Humanities building) that represents either the design or healthcare aspects of the course.

Understanding Disciplinary Bias & Transdisciplinary Communication

As noted previously, the level of effectiveness of interdisciplinary, collaborative learning is dependent on the communicative skills utilized by the students engaging in this interaction (Campbell, 2005; Derry et al., 2005; Paulus & Nijstad, 2003; van Rijnsoever & Hessels, 2010). The ability to negotiate ideas and exchange differing perspectives is dependent on the communication and relational skills employed to enact such an exchange (Derry et al., 2005; Hall et al., 2005). According to Thayer-Bacon (2000), empathy is at the core of these relational skills as it stresses believing over doubting which generates the opportunity to understand, rather than dismiss, other people's perspectives and knowledge (p. 79). These skills are, in turn, linked to the tools of imagination, intuition, and emotion which permit the exploration of and

appreciation for these ideas (Greene, 1993; Thayer-Bacon, 1998, 2000). Instructors facilitating interdisciplinary, collaborative learning environments often assume that students enter such spaces already equipped with these tools as to engage in highly productive transdisciplinary exchanges; however, this is rarely the case (Felder & Brent, 2015; Hall et al., 2012; Rosenfield, 1992; Thayer-Bacon, 1998, 2000). In most scenarios, as Thayer-Bacon (2003) suggests, these skills are “painfully acquired” (p. 107). In actuality, the likely scenario is that students adopt the biases of their discipline with regards to how they view and value what constitutes knowledge (Campbell, 2005; Giroux, 1997). *The overall implication is: Within any undergraduate, interdisciplinary collaborative course instructors must be cognizant that before students can create new kinds of knowledge, they must first understand what they conceive as being knowledge in order to address any biases that could mar effective, transdisciplinary communication (Derry et al., 2005; Goodwin, 2005).*

Similar to all prior implications, this one is related but emphasizes more discipline-derived biases that influence students’ epistemological beliefs regarding what constitutes valuable knowledge. Taking the CIDI course once more as the central example, I underscore that the faculty of this course were emphatically aware that building communication skills was an essential and vital objective throughout the course (Sanders & Geist, 2016). To further this point, at the beginning of the semester students were asked to help their counterparts understand important aspects and elements associated with one another’s discipline (i.e., introduce the Discourses associated with what it means to be an engineer or a nurse) (Gee, 2004, 2008; Sanders & Geist, 2016). This initial interaction purposefully established the tone for the remainder of the semester, wherein an appreciation and understanding for the differences and overlap of each discipline were founded (Sanders & Geist, 2016). To strengthen these initial

interactions even more, students could engage in reflections that help establish a self-awareness regarding their group's overall dynamics as well as to help establish communication objectives to better improve these dynamics over the course of the semester (Thayer-Bacon, 2000, 2010). In addition, these reflections could help students to better understand their epistemological biases as they stem from their disciplinary training that may open opportunities for them to engage with new knowledge that they might have previously dismissed (Thayer-Bacon, 2000). This type of dedicated training is essential if students are being asked to create new cultural models and social languages where they must integrate knowledge from outside their discipline (Gee, 2004, 2008).

Significance and Limitations

The significance of this work lies in three central facets developed within the content of this dissertation: the exploration of a unique, undergraduate collaborative context like the CIDI course, the novel application of a two-step *critical discourse analysis* to the CIDI course archival data, and the cultural studies implications that were derived from this analysis. As highlighted in chapter four, the CIDI course is a unique, innovative undergraduate course that integrates two distinct disciplines into a semester-long collaborative learning experience that is centered on the development of critical and creative thinking skills (Arce et al., 2015; Sanders & Geist, 2016; NAE, 2005, 2010; NAS, 2014). Within the current postsecondary environment, such courses are inherently original and aligned with the present call from educational and industrial initiatives to enhance the creative thinking skills of undergraduate students (Broome, 2016; Felder & Brent, 2015; Grasso, Burkins, Helble, & Martinello, 2008; Lee, 2004; NAS, 2014). They are also extremely intricate to implement (Anderson, 2013; Bozeman & Youtie, 2017; Felder & Brent, 2015; Hall et al., 2012; Lee, 2004). Studying such a context in depth through the CIDI course archival data thus adds to the existent literature by providing fresh insight into a new, educational

frontier (Broome, 2016; Grasso et al., 2008; NAE, 2005, 2010; NAS, 2014; Sanders & Geist, 2016).

Further, the application of *critical discourse analysis* to the CIDI course archival data is presented as original work in the field of cultural studies. As an interdisciplinary method conceptualized to explore the social implications of language patterns derived from discourse, the application of this methodology to the CIDI course archival data presents a novel way with which to understand student experiences and observations from an interdisciplinary, collaborative learning course (Rogers, 2004; Rogers, Malancharuvil-Berkes, Mosley, Hui, & O'Garro Joseph, 2005). According to Rogers (2004), the purpose of integrating *critical discourse analysis* to educational research is to help educators better understand the socio-cultural contexts within which their students are engaging and address social elements that are often embedded and overlooked within the environment. By conducting a two stage critical discourse analysis inspired by Gee's (2004, 2008) approach to *cda* on the CIDI course archival data, I offer new insight into how student discourse reflects language patterns representative of the social context as well as how such patterns are representative of the larger socio-cultural contexts within which this language is embedded (Gee, 2004, 2008; Rogers, 2004; Rogers et al., 2005).

As a cultural studies project, I connect the two stage critical discourse analysis of the CIDI course data back to key takeaways and pedagogical implications that afford educators the opportunity to improve interdisciplinary, collaborative learning spaces at the undergraduate level. The impetus for this work was derived from an understanding that cultural studies projects are meant to link theory to practice as aligned with the notion of *praxis* to help educators better their pedagogical practices towards a more inclusive, learning environment (Hall, 1980; Hytten,

1997; Wright, 1996). Hytten (1997) describes this application of cultural studies to pedagogy as a process of connecting, “ academic theory to the lived experiences and practices of people,” thereby enabling scholars to make impactful change (p. 39). As part of this discussion, I linked cultural studies literature back to the contextual, communicative, and interaction based takeaways that could be derived from the findings of this dissertation. Ultimately, through this process, this dissertation has shown that within interdisciplinary, collaborative learning environments power dynamics can manifest in the social spaces, students’ communications, and students’ preconceived disciplinary schematics which may hinder the promotion of transformative dialogue (Crampton & Elden, 2007; Hall, 1996; Giroux, 1997; Thayer-Bacon, 2003, 2017). The five pedagogical implications taken from this discussion can further praxis in the implementation of interdisciplinary, collaborative learning spaces.

Admittedly, a limitation of this study is the nature of the CIDI course archival data that was utilized for this critical discourse analysis. Specifically, students’ emphasis of their disciplinary markers in the discursive patterns they employed to reflect on their experience and observations in the CIDI course left little room to explore other significant social markers that could have influenced the power dynamics in their groups (Collins, 2015; Crenshaw, 1991; Walby, Armstrong, & Strid, 2012). These include social makers not limited to gender, social class, race, ethnicity, experience, and sexual orientation among others. Of their own accord and due to the nature of the CIDI course archival data, aside from their affiliation to either the nursing or engineering disciplinary markers, little more is known of these students. This could be an indicator of the spirit of the focus of the original questions that were being asked in the focus group interviews and debriefing sessions; it could also be an indicator of the nature of the course in that other social markers were not necessarily of focus for students in their interactions

(Corbin & Strauss, 2008; Riessman, 2008; Rubin & Rubin, 2012). Regardless of the reason, future studies might address this area of concern by collecting data that is more inclusive of a discussion of varying social elements that may touch on these social markers.

Future Research Projects

Interdisciplinary, collaborative learning environments are an inherently intricate, multifaceted topic worthy of exploration via a myriad of differing lenses. A few of these lenses were presented as part of the literature review for this dissertation: primarily, group dynamic models, communication studies, and critical social theories regarding knowledge construction. With this dissertation I explored these learning spaces through a cultural studies lens that employed *critical discourse analysis* as a way to decipher and connect student's discursive patterns with socially embedded power dynamics (Gee, 2004, 2008; Rogers, 2004). This narrow focus arguably leaves several other avenues with which to explore interdisciplinary, collaborative learning. In the following I present a few more directions in which this area of study can grow.

A Focus on the Pedagogical Model

Ultimately, the purpose of the CIDI course is to focus on the construction of new knowledge that is a result of an iterative process that begins by identifying a challenge and working through the requisite knowledge necessary to better understand and consequently design a solution to address the challenge (Arce et al., 2015; Sanders & Geist, 2016). Students progressing through the Renaissance Foundry – the pedagogical framework of the course - are learning to become not only convergence learners, but also designers within an interdisciplinary, healthcare context (Arce et al., 2015; Sanders & Geist, 2016). However, due to the nature of this dissertation, I was unable to incorporate a specific focus on this educational model and its

influence on students' learning processes. As the Foundry Model is a relatively new educational model, there is still a plethora of educational research opportunities to learn more about the key elements of the Foundry, the fidelity of implementation, and their influence on desired learning outcomes (Arce et al., 2015; Sanders & Geist, 2016). Furthering this area of research is vital to the continued improvement of this educational model as well as the betterment of best practices geared towards the development of innovative, critical, and creative thinking skills at the undergraduate level (Arce et al., 2015; Sanders & Geist, 2016). Such research could also provide vital information regarding the design and creative thinking processes associated with the learning objectives and outcomes of the CIDI course (Arce et al., 2015; Sanders & Geist, 2016).

A Focus on the Design Process

This dissertation focused on power and knowledge construction but arguably another compelling aspect of the CIDI course is the final outcome as encompassed by the prototype of innovative technology (Arce et al., 2015; Sanders & Geist, 2016). I propose that this aspect of the course could be further developed by analyzing the design of this prototype of innovative technology as an activity through an activity systems analysis, for example (Arce et al., 2015; Sanders & Geist, 2016). Activity systems analysis is founded on cultural-historical activity theory that integrates aspects of the theory of expansive learning to better understand human interaction (Engeström, 1999, 2010). This type of analysis is deeply contextual, based on a dialectical theory of knowledge, and centered on understanding the creative potential of human cognition (Engeström, 1999, 2010). To investigate the dynamics of complex human interaction, activity systems analysis asks researchers to organize human activities into six categories: subject (who is conducting the activity), tools (resources for the activity), object (motive of the

activity), rules (regulations influencing activity), community (social group involved in the activity), division of labor (tasked within the community), and outcome (end result of the activity) (Yamagata-Lynch, 2010, 2014). By graphically representing these categories into triangular diagrams, researchers are offered a visual representation of intricate relationships within the activity system (Engeström, 1999, 2010). Further, tensions and contradictions between these elements are highlighted as part of the analysis to better understand how the system functions (Yamagata-Lynch, 2010). Within the context of the CIDI course, an activity systems analysis would facilitate the interpretation of the interactions between students as they negotiate knowledge creation and engage in design (Arce et al., 2015; Sanders & Geist, 2016).

A Focus on Creative Thinking

Another perspective that is inherent within knowledge construction and collaborative learning is the development of critical and creative thinking skills. Both of these aspects can be studied from a variety of academic lenses including psychology, philosophy, and design, and many scholars have done so (Greene, 1993; Jonassen, 2011; Paulus & Nijstad, 2003; Thayer-Bacon, 2000). As the CIDI course is designed primarily as a vehicle in which to develop or refine these skills, it would be beneficial to explore these processes as factors resulting from exposure to the curricular elements of this interdisciplinary course (Arce et al., 2016; Sanders & Geist, 2016). I explore these diverse opportunities for future research on creativity herein.

From a Psychological Perspective. Scholars within the field of psychology have advanced research on creativity by arguing that it can be studied via the concept of idea generation which is delineated into two specific thinking processes: *divergent* and *convergent* (Gressgard, 2012; Paulus & Nijstad, 2003). Divergent thinking encompasses the expression of distinct or diverse ideas wherein convergent thinking is characterized by the expression of

common or similar ideas (Gressgard, 2012; Reinig, Briggs, & Nunamaker, 2007). Repeated iterations of both forms of thinking are a necessary part of idea generation (Paulus & Nijstad, 2003). Arguably, students within the CIDI course have engaged with both divergent and convergent thinking processes as they move through the varying aspects of the clinical and design phases of the course. It would be interesting and beneficial to conduct a study that focuses on better understanding these processes so that educators can leverage different aspects of collaborative learning environments to capitalize on the processes that will enhance students' creative thinking capabilities within the framework of the course.

From a Philosophical Perspective. Philosophical scholarship on education denotes that idea generation is seldom a solitary activity as social interactions expand individual perspectives by exposure to new alternatives, differing voices, and other realities (Greene, 1993; Jaggar, 1992, 1998; Noddings, 1995; Thayer-Bacon, 2000). This link further emphasizes the importance of collaboration, communication and *voice* (i.e., an individual's unique perspective as embodied by a combination of their feelings, thoughts, and intuitions) within the process of idea generation (Thayer-Bacon, 1998, p. 61). In particular, scholars posit that interaction with others is vital to developing functional meanings within a specific historical and social context (Noddings, 1995; Thayer-Bacon, 2000, 2003). Studying this type of communicative interaction and negotiation from a philosophical lens would provide a space in which to explore how social dynamics develop within different collaborative learning spaces.

From a Design Theory Perspective. Design enters the scholarship on creativity as encompassing a form of expertise that implicates a distinct way of thinking and knowing (Rowland, 2004). For Cross (2006), *designerly ways of knowing* encompasses a way of thinking that is solution-focused, constructive, and conducive to the innovative, cognitive processes that

make human thought distinct (p. 43). Nelson and Stolterman (2012) expand on this notion by providing a set of traits necessary to develop design expertise. Specifically, they suggest that designers begin with routine expertise (characterized by capacity, confidence, and capability regarding a design problem), to build adaptive expertise (fostered by the competence and courage to innovate solutions to a design problem) that leads to design expertise (founded on connections and character that value holistic perspectives) (Nelson & Stolterman, 2012, p. 227). I contend that focusing specifically on the design expertise elements is important because such expertise is not only aligned with innovative and creative thinking initiatives, but it is also a necessary component of the pedagogical techniques utilized in these spaces (Arce et al., 2016; Bransford & Stein, 1993; Cross, 2006, 2011; Krawe, 2017; Lee, 2004; Sanders & Geist, 2016).

A Focus on Practice and Other Social Contexts

Interdisciplinary collaborative learning environments are not limited to the undergraduate student setting. In actuality, the current postsecondary interest in these spaces is reflective of a larger economic, academic, and social interest in finding new ways of solving complex, social problems that involve collaboration (Hall et al., 2012; NAE, 2005, 2010; NAS, 2014; NRC, 2009a, 2009b). This interest had led to the development of collaborative and interdisciplinary spaces in distinct and diverse areas like those embodied by Research Practice Partnerships (RPPs) (Coburn, Penuel, & Gell, 2013; Penuel, Coburn, & Gallagher, 2013). RPPs are described as long-term partnerships established between educational researchers and K-16 practitioners whose aim is to investigate and address complex problems of practice (Coburn, Penuel, & Gell, 2013). The parallels between RPPs and interdisciplinary collaborative learning environments such as the CIDI course are many, including the objective to facilitate interaction between two distinct groups for the purpose of problem solving development, *inter alia* (Coburn, Bae, &

Turner, 2008; Coburn, Penuel, & Gell, 2013; Sanders & Geist, 2016). As researchers and practitioners hold different cultural models that inform their communication skills and perspective, there are similarities to those found in the findings of this dissertation that could help inform how to better such interactions (Gee, 2004, 2008; Penuel, Allen, Coburn, & Farrell, 2015). Applying *critical discourse analysis* or taking a cultural studies approach to understanding these types of collaborations and other similar partnerships could shed light on power dynamics that are present within the interactions of the community members of these groups. This area of study could, in turn, improve these communicative exchanges and better facilitate collaboration.

A Focus on Intersectionality

It would also be beneficial to explore other social identities that did not permeate the discursive patterns presented in the archival data for this course, including gender, socio-economic status, race, ethnicity, *inter alia*, as social identity is never relegated to just one identity marker (Kirn et al., 2016). It is important to understand how students' multi-faceted identities – not just those based on their disciplinary marker - influence the power dynamics, communicative processes, and overall interaction developed within collaborative learning environments (Kirn et al., 2016; Walby et al., 2012). Individuals are not a representation of simply one social construct (e.g., race, gender, ethnicity, sexuality, ability, age); rather they represent a myriad of multi-faceted social markers that comprise a more comprehensive and complex subject (Barker, 2012; Kirn et al., 2016). *Intersectionality* is a concept that represents this more comprehensive conceptualization of the self, allowing for individuals to combine, suppress, change, and adapt several aspects of their multi-faceted social selves, dependent on the context in which they are interacting (Collins, 2015; Crenshaw, 1991; Walby et al., 2012).

The term intersectionality references the critical insight that such social constructs operate, “not as unitary, mutually exclusive entities, but rather as reciprocally constructing phenomena” (Collins, 2015, p. 1). That is, an individual cannot be defined just as a female, or an engineer, or a sophomore; rather, to understand their contributions and how they make meaning through these interactions, individuals must be seen as a complete being encompassing an unremitting number of social identity markers (Collins, 2015; Svihla, Datye, Gomez, Law, & Bowers, 2016). Albeit such an implication is not necessarily new in pedagogy, it bears repeating, especially in a postsecondary environment where such interdisciplinary, collaborative courses are being designed as innovative solutions to address the focus on the development of critical and creative thinking skills (Barkley et al., 2005; Broome, 2016; Felder & Brent, 2015; Grasso & Burkins, 2010; Grasso et al., 2008; Lee, 2004; Summerfield & Smith, 2011).

Concluding Remarks

The context provided by the CIDI course is arguably a unique educational environment in which to observe interdisciplinary, collaborative interaction at the undergraduate level (Sanders & Geist, 2016). As a research consultant observing the CIDI course for one semester, I became invested in the pedagogical implications of designing courses at the frontier of so many learning strategies and interested in how such strategies influence student interactions (Arce et al., 2015; Grasso et al., 2008; NAS, 2014; Sanders & Geist, 2016). This interest provided the impetus for this dissertation. As a cultural studies scholar working within the context of education, I became fascinated with understanding the power dynamics that were inherent in such a unique, learning environment. Not only would understanding such dynamics allow for educators to have a deeper comprehension of the social, cultural, and historical markers that influence students’ interactions, but appreciating how power is constructed would also offer pedagogical implications for

improving courses that utilize collaboration as a cornerstone to critical and creative thinking processes. As I hold a professional interest in improving interdisciplinary, collaborative learning spaces (like the CIDI course), and an academic interest in incorporating cultural studies as a framework in which to accomplish this feat, I proposed this dissertation as a way to combine both passions and move this research area forward.

I entered into this dissertation research knowing that collaboration is a particularly difficult and complex subject to study within education; adding an interdisciplinary element to such complexity brings yet another level of intricacies that need to be considered. However, it is this very complexity that makes this subject so fascinating. Student interaction, especially when it is geared towards the construction of new knowledge, has unlimited possibilities with regards to innovation when harnessed as a powerful, pedagogical, technique (Anderson, 2013; Bransford & Stein, 1993; Brooks, 2013; Bruffee, 1993, 1995; Paulus & Nijstad, 2003; Shapiro, 2013). If true collaboration is facilitated, then all those involved – including students and educators - will learn something novel in the process (Anderson, 2013; Brooks, 2013; Bruffee, 1993, 1995; Derry et al., 2005; Paulus & Nijstad, 2003). Surpassing the complexities inherent in collaborative work is therefore well worth the effort.

Nevertheless, collaborations - particularly successful, interdisciplinary efforts - are far and few in the postsecondary context described in this dissertation (Broome, 2016; Felder & Brent, 2015; Hall et al., 2012; NAS, 2014; NRC, 2009a, 2009b). This is primarily because it is not easy to implement, nor are the results immediate (Bozeman & Youtie, 2017; Bruffee, 1993, 1995; Campbell, 2005; Felder & Brent, 2015; Lee, 2004; Summerfield & Smith, 2011). Learning a new social language, expanding an anchored and rooted cultural model, and engaging with new Discourses to better understand situated meanings is a gradual process that takes time,

empathy, understanding, and flexibility on the part of all those engaged in the process (Gee, 2004, 2008; Lee, 2004; Noddings, 1995; Thayer-Bacon, 2003, 2017). Adding a purposefully interdisciplinary element into this mix makes such flexibility even more difficult as disciplinary cultural models are more readily embedded into the thought processes and perspectives from which all communicative exchanges are derived (Campbell, 2005; Derry et al., 2005; O'Donnell & Derry, 2005; Paulus & Nijstad, 2003). In this sense, interdisciplinary, collaborative work is a double-edged sword – it is needed for innovation, but at the same time it can be what stifles the thought processes associated with new knowledge construction (Campbell, 2005; Milliken et al., 2005; Mueller, Melwani, & Goncalo, 2010; Paulus & Nijstad, 2003). I am not the first scholar, nor will I be the last, to confront the multifarious paradox that is interdisciplinary, collaborative work. With following remarks, however, I intend to add my own observations from this dissertation to the already intricate conversation concerning collaboration in general and interdisciplinary work in particular.

For the educators, I would emphasize that the type of interdisciplinary collaboration that leads to new knowledge construction is necessarily messy: it is negotiation, it is dissent, it is conflict, and it can be rife with internal challenges (Anderson, 2013; Arce-Trigatti, 2016; Derry et al., 2005; Paulus & Nijstad, 2003; Thayer-Bacon & Brown, 2000; Tuori & Vilen, 2011). However, it is precisely this inherent conflict that is the catalyst for transformative dialogue (Bruffee, 1993, 1995; Derry et al., 2005; Hall et al., 2012; Milliken et al., 2003; O'Donnell & Derry, 2005). Facilitating learning in such a messy environment can be particularly daunting for those designing collaborative learning environments for the first time (Felder & Brent, 2015; Lee, 2004). It takes a level of courage and commitment from all facilitators involved to enter and learn from the mess.

Therefore, let us not forget that as facilitators within interdisciplinary, collaborative learning spaces the main goal is to learn along with – and, more importantly, from – students (Anderson, 2013; Arce et al., 2015; Papert, 1980; Papert & Harel, 1991; Vygotsky, 1962, 1978). This type of mutual learning inherently requires educators to share what scholars consider to be a traditional sense of authority within this space (Anderson, 2013; Vygotsky, 1962, 1978). The power dynamics in collaborative spaces must allow for the relationship of students and teachers to be relatively egalitarian in order to foster the transformative dialogue characteristic of these spaces (Anderson, 2013; Fredrickson et al., 2013). Educators in these contexts must become facilitators of such dialogue, taking an active role as a resource for students in the construction of such dialogue (Anderson, 2013; Brooks, 2013; Lee, 2004). As learning via transformative dialogues is not a predefined process, there is still no perfect method for implementing effective, collaborative learning environments (Anderson, 2013; Barkley et al., 2005; Berger et al., 2011; Brooks, 2013; Felder & Brent, 2015; Lee, 2004; Shapiro & Permuth, 2013). Learning contexts necessarily change and student reactions to these contexts and their subsequent interactions are not predicated and controlled (nor should they be) (Anderson, 2013; Berger et al., 2011; Felder & Brent, 2015; Lee, 2004; Shapiro, 2013; Warren & Davis, 2009).

This is why it is incredibly important that the pedagogical techniques employed in these environments promote certain characteristics to ensure that transformative dialogue is, first, promoted, and second, more productive than injurious (Greene, 1993; Horton, 1998; Noddings, 1995; Thayer-Bacon, 1998, 2000). Although scholarship will vary on what these characteristics should be, I contend that the following form the foundation for educators to become facilitators of knowledge construction in interdisciplinary, collaborative learning spaces: flexibility, empathy, encouragement, and patience. Educators need flexibility to be able to read the context

and adjust their pedagogy accordingly; empathy to try to understand what students are feeling and why they may or may not be comfortable with the space, communication, or knowledge being shared; encouragement, for themselves and their students, to keep trying, to keep learning, and to keep sharing their ideas and experiences regardless of their success; and patience, to continue learning from and improving on these experiences (Anderson, 2013; Greene, 1993; Thayer-Bacon, 2000, 2003).

For the students engaging in interdisciplinary, collaborative learning, I would posit that such interaction requires the same fundamental characteristics: courage and commitment. If students are expected to create new knowledge through transformative dialogue that is messy, riddled with conflict, and prone to misunderstandings, they are effectively being asked to be vulnerable to critique, potential failures, and growth (Anderson, 2013; Derry et al., 2005; Goodwin, 2005; O'Donnell & Derry, 2005). As I expect that most students do not willingly enter into undergraduate classrooms to have their ideas continuously challenged by their peers for the sake of learning, this type of courage – to share and to critique - is yet another skill that must be acquired (Thayer-Bacon, 2000; Warren & Davis, 2009). They must therefore be committed to learning to overcome these initial discomforts in order to navigate new, unfamiliar spaces (hooks, 1993, 1995; Thayer-Bacon, 2000). It is a step in the right direction, therefore, to underscore that in fostering collaborative learning it is necessary to consider communication skills as essential (Anderson, 2013; Brooks, 2013). However, I argue that it would also be beneficial to refine what is meant by such communication skills and include the interpersonal skills needed to be promoted in order to be comfortable in becoming border-crossers of differing types of knowledge (Bozeman & Youtie, 2017; Broome, 2016; Giroux, 1997; Grasso et al., 2008; NAS, 2014).

For the interdisciplinary scholars engaging in collaborative work, I posit that what is true for educators and students in collaborative learning is inherently true for any professional partnership: there is a fundamental element of courage and commitment that is needed to make such interactions successful. This idea is proposed with the understanding that engaging with collaborative work entails a certain level of comfort with uncertainty and difference, as norms are challenged and new perspectives are exposed (Arce-Trigatti, 2016; Campbell, 2005; Derry et al., 2005; Paulus & Nijstad, 2003; Thayer-Bacon & Brown, 2000). Campbell (2005) first made his argument concerning the ethnocentrism of disciplines in a 1969 publication entitled *The Ethnocentrism of Disciplines and the Fish-Scale Model of Omniscience* (Derry et al., 2005). Almost fifty years later and the conversation as it pertains to interdisciplinary collaboration remains the same because achieving successful, transformative dialogue is not easy (Arce-Trigatti, 2016; Harvey, 2013; Thayer-Bacon & Brown, 2000). According to Derry and colleagues (2005):

The emerging picture indicates that successful integration of disparate disciplines is a complex and difficult process. Interdisciplinary work requires skillful management as well as openness to and ample time for learning new fields through collaboration. It is fraught with and builds on conflict and misunderstanding. (p. xix).

Such conflict and misunderstanding is meant to be productive and constructive, not injurious or domineering, in that it intentionally chips away at socially defined disciplinary cultural models and engages participants in new social languages necessary to explore new perspectives (Gee, 2004, 2008; Greene, 1993; hooks, 1993; Thayer-Bacon, 2000, 2010).

Ultimately, in engaging with interdisciplinary, collaborative work, all involved will come to realize that ideas are phantasmagorical, that no one holds the *only* perspective on a subject, and that perspectives are limited (Campbell, 2005; Giroux, 1997; Greene, 1997; Hall, 1996; Paulus & Nijstad, 2003; Thayer-Bacon, 2017). It will take a certain amount of courage and commitment to admit that we are limited in what we can offer to encourage transformative dialogues in interdisciplinary collaborations; nevertheless, it is this very notion that allows us to build on one another's limited views, especially when the problems are complex and multifaceted. It is not enough, therefore, to simply learn one another's language so that we can better converse across disciplines (Bozeman & Youtie, 2017; Campbell, 2005; Derry et al., 2005; Hall et al., 2005; Hall et al., 2012; Milliken et al., 2003; NAS, 2014; Paulus & Nijstad, 2003). The skills and efficacy to use this language to dissent, to misunderstand, and to share new thoughts are also essential to fill in gaps, to see perspectives from other angles, and to expand our views of the world in what so many scholars have posited as the innovation of new knowledge construction (Anderson, 2013; Derry et al., 2005; Greene, 1993; Paulus & Nijstad, 2003; Hall et al., 2012; Harvey, 2013; NAS, 2014; Thayer-Bacon, 2000, 2003). As educators, students, and scholars continue to engage in interdisciplinary collaborations, there is hope that the stagnation of the ethnocentrism of our disciplines will be overcome in favor of continued growth towards a transdisciplinary ideal (Campbell, 2005; Hall et al., 2012).

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APPENDICES

APPENDIX A

THE CONSENT FORM FROM THE ORIGINAL STUDY

Informed Consent Form

An Investigation into communication, idea generation, and prototype development in interdisciplinary (nursing/engineering) teams.

I have been recruited to participate in a study to explore the effect of interdisciplinary collaboration on communication, idea generation, and prototype development. If I consent to participate in this study, I understand that the principal investigators [REDACTED] may collect paper and electronic work that I produce during the semester. [REDACTED] The time to complete these activities will take 10-12 class periods. I understand that I will not receive any monetary compensation for agreeing to participate in this study. I may also be asked to participate in one or two short focus group interviews that will be audio recorded. The interviews will be guided by questions developed previously and approved by the IRB [REDACTED] I can choose whether or not to participate in other aspects of the study such as reflections, and can choose to not be interviewed.

The knowledge gained from this study may help to identify communication styles of interdisciplinary teams and the impact of these teams on idea generation and prototype development. All individual research results will be kept confidential. Results will only be reported in group form, and I will be provided with a group summary of the results on request.

There are no predictable physical effects associated with participating in this study. Participating or not participating in this study will not affect my grade.

I understand that I may refuse to participate in this study and am free to cease participating at any time after the study has started.

Please feel free to contact the following principal investigator with further questions:

[REDACTED]

[REDACTED]

I have read and understood this consent form, and I agree to participate in this study.

Signature

Date

Printed Name

APPENDIX B

INFORMATION REGARDING THE LARGER DATABASE

Table 1. Overview of the Data Items Pertaining to the Larger Data Corpus

	(a)	(b)	(c)	(d)	(e)	(f)
Item	CAT Pre-Test results	CAT Post-Test results	Classroom Activities	Group Related Items	Focus Group Interviews	Debriefing Notes
Type	Quantitative	Quantitative	Qualitative	Qualitative	Qualitative	Qualitative
Duration	4 semesters	4 semesters	4 semesters	4 semesters	1 semester	4 semesters

APPENDIX C

THE FOCUS GROUP INTERVIEW PROTOCOL – CLINICAL IMMERSION

Hello and thank you for agreeing to meet with us today. We are going to talk with you about your recent clinical immersion experience.

GENERAL

1. Tell us about your experience in this clinical immersion setting.
Probes: Was this your first time in this setting? Was it a familiar experience? Why? Why not?
2. What was the most impactful part of this experience?
Probes: What did you learn? How did this further your learning experience if at all?

EXPERIENCE & CHALLENGES

3. How did you feel going into this clinical immersion setting?
Probes: Did you feel prepared? What were some aspects of the experience that surprised you? What did you expect?
4. What were some challenges or obstacles that you encountered in this setting?
Probes: What were the academic challenges? Personal challenges? Team challenges?
5. What were some technological concerns that you had in this clinical immersion experience?
Probes: What were some of the questions/concerns you developed in this experience?
6. Were you able to apply what you have learned from class to this setting or vice versa?
Probes: Provide examples of these applications

TEAM EXPERIENCES

7. Tell me about your interaction with your colleagues.
Probes: Were there opportunities to learn from one another? If so, could you provide an example? Was it difficult to talk to one another? Were you on the same page?
8. What type of communication challenges did you encounter?
Probes: Did you find yourself interacting more with students from your discipline? More with students outside of your discipline? Why do you think this is?
9. What did you enjoy about working with your team in this setting? What did you not enjoy?
Probe: Was it difficult to get ideas across? Was it easy to understand one another? Why?
10. Did you feel that some members of your team held more academic or technical authority in this setting than others?
Probe: Why do you think they held this authority? Did this inhibit you from learning or advance your learning experience? How? How would you address this in the future?

CONCLUSIONS

11. Is there anything we haven't talked about today that you think it's important for us to know regarding your clinical immersion experience or your experience with your team?

APPENDIX D

THE FOCUS GROUP INTERVIEW PROTOCOL – DESIGN SETTING

Hello and thank you for agreeing to meet with us today. We are going to talk with you about your recent experience with your group in developing your group challenge and prototype for this course.

GENERAL

1. Tell us about your experience so far in working with your group to develop the prototype for this course.

Probes: How has it been different from other group experiences you have had?

EXPERIENCE & CHALLENGES

2. What starting point did you use to recognize the challenge you chose as a group? That is, how did your group decide on this prototype idea?

Probes: Take me through the mental process and rationale that led to this decision.

3. How has your challenge for this course progressed since the last time you had a group meeting?

Probes: Take me through what you have done as a group so far since your last team meeting.

4. What are some of the tools (e.g., resources or promoters) that your team used to formulate this challenge?

Probes: Has the resource cart played any role in the design of your prototype? What about the clinical immersion experiences or other course experiences? What tools were missing/do you need?

5. What are some of the tools (e.g., resources or promoters) that your team has used to progress the design of your prototype?

Probes: Has the resource cart played any role in the design of your prototype? What about the clinical immersion experiences or other course experiences? What tools were missing/do you need?

6. What were any technological concerns that you had in mind when attempting to settle on a prototype idea? What about while working on the development of this prototype?

Probes: What were some of the questions/concerns you developed? From the Nurses? From the Engineers? Has this impacted your group's decision to move forward with this idea?

7. What experiences have most benefitted the formulation of the challenge for your group?

Probes: Talking with your teams, the resources, the professors, etc.

8. What role do you think creative thinking played in formulating this challenge for this course?

Probes: How is your challenge a reflection of creative thinking? Is it?

9. What experiences have most benefitted the development of this prototype for your group?

Probes: Talking with your teams, the resources, the professors, etc.

10. What role do you think creative thinking has played in the development of this prototype?

Probes: Are there any outside of the box ideas that have occurred in the group meetings? Take me through that experience.

TEAM EXPERIENCES

11. How do you characterize your overall group experience thus far?
Probes: Is this idea, design, and/or development of your prototype progressing to a place where you think it will be ready by the end of the semester? Why? Why not? Inquire about linear v. nonlinear thinking strategies.
12. Tell me about your interaction with your colleagues in formulating this challenge.
Probes: Were there opportunities to learn from one another? If so, could you provide an example? Was it difficult to talk to one another? Were you on the same page?
13. Tell me about your interaction with your colleagues in working on this prototype.
Probes: What is the group dynamic so far? Were there opportunities to learn from one another? If so, could you provide an example? Was it difficult to talk to one another? Were you on the same page?
14. What type of communication challenges have you encountered?
Probes: Did you find yourself interacting more with students from your discipline? More with students outside of your discipline? Why do you think this is?
15. What did you enjoy about working with your team in this setting? What did you not enjoy?
Probe: Was it difficult to get ideas across? How open was your group to accepting new ideas? Was it easy to understand one another? Why? How were new ideas integrated into the prototype development?
16. Did you feel that some members of your team held more academic or technical authority in this setting than others?
Probe: Describe this authority. Why do you think they held this authority? Did this inhibit you from learning or advance your learning experience? How? How would you address this in the future?
17. Was there any one person that took the lead in attempting to settle on an idea for the challenge/prototype design?
Probes: Why did this person take the lead? How did that conversation develop and progress? How were new ideas integrated into the prototype development?

CONCLUSIONS

18. Is there anything we haven't talked about today that you think it's important for us to know regarding your clinical immersion experience or your experience with your team?

APPENDIX E
DEBRIEFING NOTES WORKSHEET

Clinical Immersion at Disciplinary Interfaces: Debriefing Questions

1. What is your first reaction/ thoughts?
2. What went well? What didn't? Why?
3. Was there a differences between what you expected to happen and what did? How did you feel about that?
4. Were there any surprises/puzzlements?
5. What was the biggest challenge?
6. What do you understand better about yourself/ your team?
7. What did you enjoy most about clinical?
8. What were some of the needs your team identified?
9. What will be your focus for the next clinical immersion day?

APPENDIX F

DESCRIPTIVE TABLE OF STUDENT POPULATION

Table 2. CIDI Course Student Descriptors

	Female	Male	Non- Traditional	International
Nursing	5	2	3	0
Chemical Engineering	3	4	3	2
Total	8	6	6	2

APPENDIX G

DESCRIPTIVE TABLE OF STUDENT TEAMS

Table 3. Clinical Immersion Team Composition

	Team 1	Team 2	Team 3	Team 4
Nursing	2	1	2	2
<i>Gender</i>	<i>1 female and 1 male</i>	<i>1 male</i>	<i>2 females</i>	<i>2 females</i>
Chem. Eng.	2	2	2	1
<i>Gender</i>	<i>1 female and 1 male</i>	<i>1 female and 1 male</i>	<i>1 female and 1 male</i>	<i>1 male</i>
Total	4	3	4	3

APPENDIX H

DESCRIPTIVE DATA REGARDING THE ARCHIVAL DATA

Table 4. Descriptors of the Archival Data, Focus Group Transcripts

	Clinical Immersion Transcript	Design Meeting Transcript
Team 1	Minutes: 26:10 Word count: 5141 (LifeFlight Center)	Minutes: 34:42 Word count: 8256 (Presentation Room)
Team 2	Minutes: 13:29 Word count: 3037 (Makerspace)	Minutes: 34:29 Word count: 7980 (Library)
Team 3	Minutes: 17:43 Word count: 4257 (Hospital)	Minutes: 31:11 Word count: 8362 (Library)
Team 4	Minutes: 14:11 Word count: 3886 (Hospital)	Minutes: 34:20 Word count: 7514 (Makerspace)

APPENDIX I

TABLES OUTLINING PROCEDURES FOR STAGE 1 OF THE CDA

Table 5. Example of Tagged Archival Data and Relevant Codes

Example	Excerpt from Archival Data	Archival Data Tagged with Building Tasks (Gee, 2004)	Relevant Codes
1	<p>The nurses that spoke to us were very knowledgeable, I enjoyed listening. I wish I'd known some background information.</p> <p><i>[Engineering Student]</i></p>	<p>The nurses <i>[Identity Task]</i> that spoke to us <i>[Activity Task]</i> were very knowledgeable <i>[Significance Task]</i>, I enjoyed listening <i>[Activity Task]</i>. I wish I'd known some background information <i>[Politics Task]</i>.</p>	<p>Relevant Information Listening Communication Challenge Role of Nurses Resources</p>
2	<p>I gained a lot of knowledge from watching but I wish I could have talked to nurses more.</p> <p><i>[Engineering Student]</i></p>	<p>I gained a lot of knowledge from watching <i>[Activity Task]</i> but I wish I could have talked <i>[Politics Task]</i> to nurses more <i>[Relationship Task]</i>.</p>	<p>Observing Communication Challenge Desire to Learn Type of knowledge Role of Nurses Resources</p>
3	<p>[I enjoyed] talking to the nurse that we shadowed. We didn't have much of an opportunity to talk to patient, but we did talk to a helpful nurse!</p> <p><i>[Nursing Student]</i></p>	<p>[I enjoyed] talking to the nurse that we shadowed. <i>[Activity Task]</i> We didn't have much of an opportunity to talk to patient <i>[Sign System Task]</i>, but we did talk to a helpful nurse! <i>[Politics, Activity Task]</i></p>	<p>Role of Nurses Active Relevant Information Role of Patient Excitement Desire to Learn Communication</p>

APPENDIX J

PARTIAL LIST OF CODES

Table 6. Partial List of Codes

Active Interaction	Experience	Problem Identification
Anticipation	Exploration	Problem Solving
Anxiety	Familiarity	Professionals
Challenge	Fearful	Relevant Information
Comfort	GroupMe	Resources
Common Ground	Ideation	Rethinking
Communication	Lack of Knowledge	Role of Nurses
Communication with Nurse	Listening	Role of Patients
Communication with Patient	Misconceptions	Role of Resources
Communication with Peers	Nervousness	Role of Software
Competency	New	Shared Understanding
Design Related Aspects	New Ideas	Student Perspective
Desire to Learn	Not Understanding	Talking
Difficulties	Nursing Perspective	Teaching
Discomfort	Observing	Technology
Drawing	Outside Research	Too much information
Engineering Perspective	Overwhelmed	Type of Knowledge
Excitement	Passive Interaction	Uneasy
Expanded Perspective	Peer Interaction	Unfamiliarity
		...

APPENDIX K

PRESENTATION OF THEMES

Table 7. Presentation of the Themes

	(1)	(2)	(3)
Type of Themes	Candidate Themes	Thematic Map	Overarching Themes & Sub-Themes
<i>Phases</i>	<i>Defining</i>	<i>Reviewing, Refining</i>	<i>Evaluating, Reporting</i>
Resulting Themes	Aligned expectations Caring Common Ground Communication with Peers Communication with nurses and patients Communication Confidence Curiosity Discomfort Doubt Engineering Identity Feeling Overwhelmed Flexibility Knowledge advantage Knowledge Gap Listening to others New ideas Nursing Identity Observing the environment Out of Place Patient Care Positioning Problem Identification Problem Solving Product Improvement Taking the Lead Teaching Unaligned expectations Unexpected experience Unfamiliarity	Aligned Expectations Attitude Common Ground Confidence Dependence Exploration Insider Listening and Observing Newness Outsider Overwhelmed Problem Identification Problem Solving Talking and Interacting Teaching Unaligned Expectations Understanding	Positioning <i>Insider</i> <i>Outsider</i> Expectations <i>Aligned</i> <i>Not Aligned</i> <i>Newness</i> Ability to Contribute <i>Dependence</i> <i>Overwhelmed</i> Engagement <i>Exploration</i> <i>Listening and Observing</i> <i>Talking and Interacting</i> Design Expertise <i>Problem Identification</i> <i>Problem Solving</i> Leadership <i>Attitude</i> <i>Teaching</i> Team Dynamics <i>Confidence</i> <i>Understanding</i>

VITA

Andrea Arce-Trigatti began her postsecondary academic journey at Florida State University where she earned a Bachelor of Science in International Affairs and a Bachelor of Arts in History and Latin American and Caribbean Studies. She also holds a Master of Arts in International Affairs from the Florida State University as well as a Master of Science in Educational Policy Studies from Vanderbilt University. Throughout her graduate studies in the Learning Environments and Educational Studies program at UTK, she has been an active member of the Renaissance Foundry Research Team whose educational model, the Renaissance Foundry, received the Thomas C. Evans Instructional Paper Award from the ASEE-Southeast Section in 2014 and the companion ASEE Zone II Best Paper Award in 2015. As a scholar, her primary research interests center on issues of diversity in education, multicultural education, critical and creative thinking processes, and the implementation and effectiveness of collaborative learning environments, particularly in interdisciplinary settings.