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*"Getting on the same page": Negotiation and intellectual  
collaboration in student research groups*

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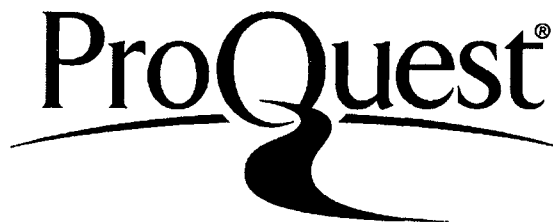
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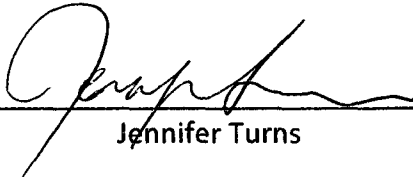
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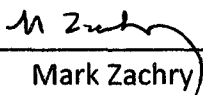
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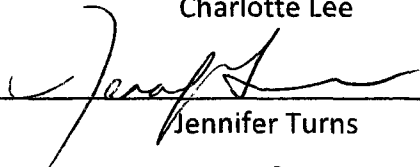
  
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Abstract

**“Getting on the same page”: Negotiation and intellectual collaboration in student research groups**

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There is a growing interest in what constitutes effective practice in faculty-led research based learning experiences that involve students learning research by doing research. There is a particular need for research-based evidence about the student experience, their intellectual and personal gains, and the learning processes that contribute to those gains. To address these concerns, this qualitative case study investigates the intellectual collaboration—the meaning making practices—in two research groups of faculty and students doing qualitative data analysis.

Negotiation is a key aspect of coding and reliability methods that use measures of agreement among multiple coders to ensure rigor. Negotiation means that *participants worked through their differences until they reached agreement. The groups were cooperative not competitive but there was a tension between research productivity and learning goals. “Getting on the same page” required getting novice coders up to speed in a short period of time.*

The lens of negotiation revealed that there was significant producing and learning occurring. Negotiation was both an intentional and emergent training and organizing process. Students learned about how research is done and gained increased confidence in their ability to do and contribute to research. They also negotiated an understanding of norms such as reflexivity and their roles in the group. Such gains indicate the ability to “think like a researcher” and were associated with participation in reliability exercises. These negotiated activities involved multiple perspectives, collaboration with participants of different levels of experience, and tools and processes that provided common objects for negotiations.

This study suggests that structuring research and other intellectual collaborations around negotiation processes can contribute to both inclusion and rigor, balancing productivity and learning and goals. These approaches increase the likelihood that *students will be productive and learn about research despite the short time frame and complexity of the tasks*. These same qualities provide benefits to faculty and establish the value of research based learning experiences as curricular offerings.

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- The participants in my two research groups who worked out some wicked problems
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This dissertation is dedicated to:

Robin and Bella who went the distance with me

and to the memory of my parents

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## Chapter 1 Introduction

*One of the enduring difficulties of building new knowledge is the need to seek difference, to tolerate dissonance, and to embrace the generative possibilities of conflicting ideas and competing realities within the process of inquiry (Flower, 1994, p. 239).*

### **Voices of Participants in the Research Groups:**

Nathan, undergrad: The high point was everyone had to think on same page. Low point was how long it took to get on one page. Disappointed couldn't get on the same page [earlier] probably due to different backgrounds.

Nelda, undergrad: I just liked seeing this whole big numbers that eight people saw it this way, but one person didn't agree.... We tried to talk about it and get them on the same page.

Delilah, doctoral student: All science is negotiation, even the hard sciences.

Frank, faculty: I don't think it's reasonable to expect all of us would code the transcripts in exactly the same way, but we got to the point where there was a high degree of reliability.

There is a growing interest in investigating the intellectual gains for students involved in research experiences. A central principle of constructivist pedagogical theories is that learning by doing produces higher order learning outcomes for students (Baxter Magolda, 1991, 2001; Ramsden, 1992; Smith, Sheppard, Johnson & Johnson, 2005).<sup>1</sup> These outcomes include gains in intellectual development, such as the ability to apply, integrate, and synthesize knowledge, not just simply acquiring new content or

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<sup>1</sup> Constructivism, according to Castley (2006), views the learner as actively constructing knowledge and meaning and not just receiving information or expertise. Prince and Felder (2006) expand the definition: "students construct their own versions of reality rather than simply absorbing versions presented by their teachers" (p. 123).

skills. Research based learning experiences (RBLEs),<sup>2</sup> which involve working collaboratively with faculty and peers in real research settings, are thought to be particularly promising in this regard (Boyer, 1990; Castley, 2006; Hunter, Laursen & Seymour, 2007; Turns & Ramey, 2006).<sup>3</sup> Current theories about student motivation also predict that RBLEs support intrinsic motivation through engagement and autonomy, thereby, contributing to deeper learning (Castley, 2006; Hunter et al. 2007; Kuh, Schneider & Association of American Colleges and Universities, 2008).

Despite the broad perception that RBLEs support intellectual development, there is limited evidence for cognitive gains from research experiences. In fact, the existing body of literature is limited and inconclusive in this regard (Prince, Felder & Brent, 2007; Hunter et al., 2007; Seymour, Hunter, Laursen, & DeAntonio, 2004). In general, the experience of students has been ignored (Crowe & Brakke, 2008; Seymour et al., 2004). Hunter et al. (2007) identify a particular need for more research focused on impacts on the epistemological development of students, moving beyond institutional outcomes and extrinsic measures of success.

There have been many initiatives to make research experiences more widely available to all students during the decade since the Boyer Commission's (1998, 2002) call for action. However, RBLEs are still limited largely because of constraints on faculty

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<sup>2</sup> My term, adapted from Turns et al. (2004), who call them research based instructional activities. Griffiths (2004) calls them research-based teaching strategies, I am appropriating and modifying the term to focus on learners.

<sup>3</sup> RBLEs are a subset of inquiry based learning (Kreber, 2006) or what Prince and Felder (2006) call inductive teaching methods. Such experiences are student centered (involve students taking responsibility for their own learning) and support active learning, primarily through processes of problem solving and asking and answering questions.

time (Prince et al., 2007). Kreber (2006) suggests that looking for new models of how to offer such research experiences might make them more equitably available.

In order to address these concerns, this qualitative case study uses the lens of negotiation to investigate the intellectual collaboration between faculty and students doing qualitative data analysis. Negotiation means that participants worked through their differences until they reached agreement. Intellectual collaboration comprises the knowledge making practices and tools in the groups. The two student research groups in my study differed from the more familiar apprenticeship-like laboratory research experiences. They were short-term collaborative small group experiences designed to make the learning process visible rather than relying solely on tacit enculturation or socialization processes to develop mastery. Both groups were cooperative not competitive. However, there was a tension between production and learning goals because “getting on the same page,” a term used by participants, required getting novice coders up to speed in a short period of time. Thus, they are potentially rich sites for studying intellectual collaboration as negotiated meaning making (Flower, 1994).

This study follows the lead of Hunter et al. (2007) in making the educational processes visible together with the student experience. Specifically, I consider how the lens of negotiation can help: 1) characterize the products and processes of participation in the knowledge making activities of the two groups and 2) account for the range of experiences and outcomes for students. Educational processes can be broadly understood to include a variety of factors such as curriculum, learning modalities, teaching practices, and technologies. In this study, I focus on the negotiated group

processes associated with the activities of coding and article writing as learning processes. The outcomes of interest relate to learning to “think like a researcher,” learning the norms and attitudes of qualitative researchers (Hunter et. al, 2007), as well as how to do qualitative data analysis.

## **1. Coding as a Negotiated Activity**

Negotiation is a key aspect of qualitative data analysis, particularly in coding and reliability methods which use measures of agreement among multiple analysts to ensure rigor. Both research groups, which took place almost two years apart, were involved in the laborious process of coding qualitative interview data. Coders used the same data set from a larger externally funded study, the Study of Engineering Education Decision Making (SEED). Coding is a signature activity of qualitative data analysis, particularly of verbal data (Geisler, 2004; Ryan, 2003). Although there are many types of coding, most involve some combination of data reduction and interpretation that converts raw text into structured data and usable results (Miles & Huberman, 1984; Thomas, 2006). In this study, the first group used an exploratory inductive approach to finding themes in the data; the second group used a hybrid approach that involved filtering with a set of deductive filters (theory driven) with inductive analysis grounded in the data. Chapter 4 describes the coding activities in more detail.

I did not start the study with a focus on negotiation; rather I began with a more general goal of comparing the material practices in the two SEED groups. “Getting on the same page,” a common term in the second group illustrated in the quotations at the

beginning of this chapter, was provocative. Negotiation was a dimension that emerged early in my analysis that potentially could bring together the local experience of participants with theoretical concepts of knowledge construction. Having identified negotiation as a potential analytic lens for studying intellectual collaboration, I had to operationalize negotiation.

I developed a two-part negotiation framework with a: 1) conceptual element based on theory and research that helped me define negotiation; and 2) a typology of negotiations based on an existing empirical typology for groups processes, which I modified because of how negotiations were enacted in my data. The conceptual part of my framework was driven by social constructivist learning theories, which assume that knowledge construction involves the negotiation of shared meaning. For example, Flower (1994) demonstrated that negotiations are potentially powerful sites for meaning making for both individuals and groups. Chapter 2 discusses the body of literature on which my framework rests in more detail.

The language of negotiation is omnipresent in the study of both collaborative and individual knowledge construction but it is not usually defined directly, rather its characteristics or functions are described as is the case with Flower's (2003) use of negotiation of shared meaning: "the attempt to interpret and manage conflicting voices results in provisional resolutions and—at times—in restructured understanding" (p. 243). Similarly participants in my study use the term negotiation frequently and in a variety of ways, sometimes metaphorically and sometimes more literally.

For my purposes, negotiation means that participants work through their differences until they reach agreements, perhaps compromises, acceptable to all (Hinshaw, 1981). These differences may be resolved through discussions and through the use of other discursive or communicative symbolic tools such as documents, correlations, or spreadsheets (Smart, 1998, 2006; Gygi & Zachry, 2010). These groups were cooperative not competitive groups and their negotiations involved primarily conceptual differences. Thus, as in all collaborations, the potential existed to maximize everyone's outcomes, primarily through increased coordination and the ability to be more productive collectively.

As my analysis reveals, negotiation is potentially a powerful lens for studying intellectual collaboration in RBLEs, because it helps to see and describe the group dynamics in the process of conducting task-oriented activities such as coding (McGrath, 1983, 1991). Furthermore, it helps make the connections between group interactions, work products, and participant take-aways in terms of learning and other outcomes. Negotiation is a recognized and tested construct in small group research in the social sciences and is a norm for constructivist pedagogies. Thus, it helps bridge the study of the production and learning activities that co-existed in my study groups.

## **2. How This Study is Situated Epistemologically/Disciplinarily**

This study is situated in the emergent interdisciplinary research community associated with my host department of Human Centered Design & Engineering (HCD&E) and the related community of engineering education researchers in the Center for

Engineering Learning and Teaching (CELT). Because of my interest in local knowledge production and collaboration in small groups, I chose to conduct a qualitative case study which by definition privileges the local. My intent was to start where I am at (Lofland & Lofland, 1995) by understanding the research activities housed in my own department, then widen the gyre.

These groups, called directed research groups by the host department of Human Centered Design & Engineering (HCD&E) have been characterized in published reports as curricular innovations that involve learning to do research by doing research, and that balance production and learning goals thru shared participation, thereby benefitting both faculty productivity and student learning. Students (Larson et al., 2009) and faculty alike (Turns & Ramey, 2005, 2006) have reported them to be valuable experiences that raise potentially generative tensions between productivity and learning goals.<sup>4</sup>

I was a participant in both groups, which took place almost two years apart, and also a research assistant helping to manage the group's activities in the second group. Later, the opportunity arose to go back and conduct a retrospective analysis of the activities and products of the two groups, followed by interviews with participants. This study combines two strands of research from my doctoral studies: research on negotiation as an organizing dynamic (Gygi & Zachry, 2010) and on pedagogical strategies/effective teaching practices that contribute to student engagement through intrinsic motivation (Turns, Gygi, & Prince, 2010).

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<sup>4</sup> In this document, I refer to Larson et al. (2009) as the student-led TC article and Turns and Ramey (2006) as the faculty-led TC article, respectively.

I was particularly influenced by those who recognize the complexity of epistemic endeavors and the seemingly mundane yet rich contribution of the social and artifactual dimensions of collaborative learning. Although Linda Flower, Joseph McGrath, and Graham Smart are an unlikely triumvirate, their common interest in empirical studies of epistemic work and the role of group processes, combined with their individual and respective disciplinary interests in cognition, group interaction, and materiality, provided me with the foundations for an analytic framework that allowed me to “see” negotiations in my data.

Because none of these bodies of scholarship really provides a systematic methodology for studying the dynamics of small groups, I turned to the organizational management literature, and found communities of practice literature (Lave & Wenger, 1991; Wenger, 2000) to provide useful vocabulary and McGrath’s (1983, 1991) models of small group processes to be particularly useful for operationalizing my theoretical constructs. Eventually, I found negotiation to be an excellent bridging concept between a number of disciplines that also allowed me to consider the complex and interrelated roles of materiality, group interactions, and individual experiences in the work of the two SEED research groups.

My motivation is both pragmatic and methodological. My primary motivation is to contribute to a better understanding of how to train novice researchers and to support them through practice-oriented tools and activities. However, the original impetus for studying these groups came from my investigations of community-based research (CBR) projects, which revealed a glaring gap in how the actual work of

collaborative research gets done. In the case of CBR, the rhetoric of community empowerment masks the fact that the worker bees are students and students are mostly invisible in this work. Framing students as knowledge workers could be potentially empowering. Here is an opportunity for them to shine.

### **3. Study Overview**

I followed Smart's (1998, 2006) interpretive ethnographic approach combining linguistic, theoretical, and observational investigations with textual analysis. I did not begin the study with a focus on negotiation. Rather, I began my analysis with a general comparison of the two research groups, looking for the differences that matter both from the point of view of the participants and what was significant to me, the analyst (Silverman, 2001). Having identified the importance of negotiation in the processes of the second group in particular, I realized that negotiation might provide a lens to investigate the material practices of the group and how they helped balance production and learning goals. My initial research questions were:

**RQ1. What are the differences that matter between the two groups in the material practices associated with coding and article writing?**

**RQ2. What do the artifacts produced by the groups reveal about tensions related to learning to do qualitative data analysis?**

Having developed a negotiation framework, I addressed the following research questions:

**RQ3. What does the lens of negotiation reveal about the types of task-related group processes that occurred in the two groups?**

**RQ4. What do the interviews reveal about individual participants' experience of these task-related and possibly other types of negotiation?**

Data were collected through a variety of methods including participant/observation, review and inventory of artifacts generated by the groups, retrospective formal interviews with participants, and informal interviews with members of the wider research community. There are three analysis chapters: focusing on materiality (genre analysis), group processes/participation (negotiation analysis), and individual experience (thematic analysis of interviews), respectively. Each reveals a different aspect of the negotiations involved and contributes to a richer understanding of the processes of participation and the effects of that participation on participants in the research groups.

The purpose is not to say that one group was better than the other. The mode of participation was inclusive and participatory in both groups, but the nature of the tasks in the second required more interdependence in order to meet production and (I argue) learning goals within the time frame of the academic quarter. Participants had to get up to speed in terms of learning how to code in this short time period, they had to “get on the same page” (their term) regarding norms, roles, and how to do the tasks optimally. A distinctive feature of the second group was the creation and use of code book through a series of negotiations and reliability checks. The second group was more mature in methods used and extremely tool and artifact rich. I found that the origins of these tools can be traced back to the first group and the need to resolve tensions and challenges that were identified by participants. The implications of these features are explored throughout this dissertation.

## 4. Contributions

This dissertation presents a case study of how students learned to do qualitative research of a particular kind, in a particular context. As befits a case study, it “sophisticates the beholding” (Renz, 1999) about a particular case. It also identifies important characteristics of the pedagogical and organizational strategies and tools, and how they were used by the groups to support their intellectual collaboration. In particular, it considers the multiple roles that negotiation can play in such research groups and how the processes in the groups affect the experience of individual participants and their learning.

As Hunter et al. (2007) note, epistemological gains are hard to identify and articulate, both for researchers and for students and faculty. My negotiation framework puts the focus squarely on epistemic practices. Furthermore, my attention to artifacts allowed me to talk to participants in the interviews about their experience and the impacts of the practices and tools associated with the group negotiations. The artifacts made the work practices visible to them and me.

Although the faculty lead used inclusive pedagogical strategies, the coding activities involved a highly constrained form of collective decision making in which persuasion and buy in were crucial. Based on my analysis, my contention is that negotiation was an effective training tool and that negotiated activities helped participants in the second group in particular coordinate their work, contributing to inclusion and rigor. I make specific claims about how generic tools and activities, which were inherited from the larger community of practice in which the research groups

were situated, helped train novice researchers quickly and allowed them to transform a large amount of raw interview data into structured, usable research results in a short period of time. The tensions between production and learning goals were managed productively, leading to successful outcomes (defined by the participants) such as research results and learning new ways of participating in group learning experiences.

By investigating context and situated practices, my study provides rich information for other educators interested in conducting RBLEs, and potentially other types of learning by doing experiences involving participants with different levels of experience. This work can form the basis for more extensive evaluation of research-based learning experience as well as the development of design heuristics to support effective learning experiences, as discussed in the final chapter of this document.

This study also has implications for making research based learning experiences more equitably available. Given that both faculty and students have limited time and resources, and many competing demands, it is important to look at research groups that are short-term and can accommodate large numbers of participants. My findings suggest that negotiated activities can lead to an inclusive environment and also contribute to rigor. These factors increase the likelihood that students will learn and be able to perform effectively despite the short time frame and complexity of the tasks.

## **5. Organization of Dissertation Chapters**

The remainder of this dissertation is organized as follows: Chapter 2 situates my study in terms of conceptual frames, discourse communities, and relevant bodies of

research. Chapter 3 explains my methodological approach and describes the data collection and analysis activities for the three analyses in my study. Chapters 4 and 5 address the educational processes associated with the research groups. Chapter 4 presents a mini comparative case study of the material practices related to coding and article writing in the two SEED groups. Negotiated activities and tools emerge as important dimensions for further investigation. Chapter 5 describes the negotiation typology that I developed and how it revealed significant points of negotiation in the two groups. Because of the prominence of negotiation in the second group, I characterize it as a high negotiation group and consider the significance of these negotiations.

Chapter 6 turns to the experience of individual participants in the second group and the learning outcomes associated with the processes of negotiation. The importance of role negotiation and lingering methodological tensions is foregrounded. Chapter 7 revisits negotiation as a lens for studying intellectual collaboration and discusses the significance of key findings from this study in light of the bodies of theory and research related to meaning making in the context of coding. The discussion and conclusions focus on the intellectual gains and processes that Hunter et al. (2007) deem crucial to understanding effective practice in RBLEs. This final chapter briefly considers the implications for designing effective RBLEs and the relevance of these findings to other settings.

## **Chapter 2**

### **Situating the Study in the Literature**

This chapter situates my study in terms of conceptual frames, discourse communities, and relevant bodies of research. It begins with an overview of the assumptions about knowledge construction and intellectual collaboration in the context of small groups. Constructivist pedagogies assume that negotiation of shared meaning is a process that underlies student learning in research experiences (Hunter et al., 2007). However, how negotiation of shared meaning is enacted as a group phenomenon has been largely ignored in studies of research experiences. The notable exception is the importance that has been attached to the student's relationship with a faculty mentor and to a lesser extent with their peers (Hunter et al., 2007; Kuh et al., 2008; Seymour et al. 2004).

In order to develop a negotiation framework that made the collaborative meaning making activities associated with coding visible, I turned to genre studies, and models of group interaction processes. The assumptions that I derive from these bodies of literature are discussed in Sections 1 through 3 of this chapter. Rhetorical genre theory is particularly relevant to my study because learning experiences are rhetorical situations (Flower, 1994). Furthermore, genre theories and methods foreground the importance of artifacts and materiality, providing a way to make the processes visible. The conceptual basis for my negotiation framework relies on the process studies of Flower (1994) and McGrath (1983, 1994) who focus on negotiation. In Section 4 I discuss what is known about the value to students of participation in research experiences and

characterize my study groups as research based learning experiences. I appropriated this term from Turns et al. (2004), who call them research based instructional activities. Griffiths (2004) calls them research-based teaching strategies, I am modifying the term to focus on learners. In the final section, I discuss coding activities as a potential site for negotiations.

## **1. Negotiation as Meaning Making**

In this study, I use negotiation as a lens for studying intellectual collaboration. The fundamental assumption underlying my negotiation framework is that knowledge construction entails the negotiation of shared meaning. Meaning making is a negotiated activity. This principle is a foundational assumption of social constructionist epistemologies that underlie social science research methods and constructivist pedagogies as discussed below. Although the two schools of endeavor have similar epistemological and ontological underpinnings, they diverge in their focus of research: the social scientists focusing on group interactions, processes, and artifacts; the educational researchers focusing on the individual experience (Bonk & Cunningham, 1998).

Constructivism, according to Castley (2006), views the learner as actively constructing knowledge and meaning and not just receiving information or expertise. Prince and Felder (2006) expand the definition: “students construct their own versions of reality rather than simply absorbing versions presented by their teachers” (p. 123). Tracing themselves back to Berger & Luckman (1966), social constructionist pedagogies

assume that new knowledge arises from epistemic conflict (Bruffee, 1984; Harasim, 1995). This view of learning is particularly relevant to a study of the role of negotiation in knowledge construction. Flower (1994) claims that negotiation is a better metaphor for meaning making in cases of purposeful and aware knowledge construction than other metaphors such as reproduction or conversation, because it acknowledges both agency and social constraints and accounts for conflicting perspectives.

Her studies of students engaged in collaborative writing tasks demonstrated that moments of negotiation were potentially powerful moments of student development, agency and social interactions. As discussed in Section 4 of this chapter, constructivist pedagogies assume that negotiation of shared meaning is a process that underlies student learning in research experiences (Hunter et al. 2007). Although she acknowledges situated learning as an important dynamic in the classroom, like other cognitivists, be they of the social bent or not, Flower (1994) sees a division between the individual and the social context. For example, she says that collaboration alters the ways in which the social context supports learning. In these contexts, social interactions become more salient.

My first task was to derive a heuristic definition for negotiation. For example, Wenger (1991), whose community of practice theory has been influential in both realms, explains that “negotiation of meaning” can entail either or both of two dimensions: 1) reaching an agreement among people and 2) the accomplishment of something that requires sustained attention and readjustment by an individual or groups” (p. 53). Both dimensions are relevant to my analysis. My working definition for

this study is that negotiation involves participants in the two SEED research groups working through their differences until they reach a resolution.

My assumptions about negotiation are:

1. Negotiations are potential sites for knowledge construction and learning
2. The collective space of negotiations represents (helps describe and see) the intellectual collaboration of the group
3. Negotiations can be seen in the artifact trails (genres) produced by the group

The lens of negotiation provides a way of “seeing” knowledge construction by the group. However, it is important to acknowledge that all models of knowledge construction involve a leap of faith, since we cannot yet directly observe mental processes and constructions. In Chapter 5 I discuss the typology that I used in my negotiation analysis to identify significant points of negotiations evidenced by group interactions. This typology was adopted from McGrath’s (1983, 1991) typology of group interaction processes and is based on empirical studies of task oriented groups. In the next section, I focus on the theoretical and methodological underpinnings from genre studies that help shape my methods and analysis.

## **2. Assumptions about Intellectual Collaboration**

Intellectual collaboration entails a group of professionals, or pre-professionals in the case of students, creating specialized knowledge through discursive practices, both written and oral, and other symbolic resources and tools (Bazerman, 2004; Russell, 1997; Smart 1998, 2006). A genre such as a coding protocol can be understood as typified social action (Miller, 1994), serving as a pedagogical and research tool, analytic

framework, and “organizational memory.” This study extends the notion of what Spafford et al. (2006) call apprenticeship genres and Dannels (2000) calls genres of professionalization and looks at the research group itself as a hybrid school/professional genre that encompasses multiple lower level genres.<sup>1</sup> In this context, the creation and use of documents, for example a coding protocol (“code book”) or a conference paper, embodies social activities that permit novice and master practitioners to negotiate shared meaning and develop shared practice.<sup>1</sup>

Genre analysis provides a powerful method for studying knowledge construction in the context of qualitative data analysis because it reveals the observable traces of mental activities that are inscribed in the textual and other artifacts produced by the group. Thus, I can show how tacit knowledge is externalized and made visible so that the group can get its work done. Rhetorical genre theory is particularly relevant to my study because learning experiences are rhetorical situations (Flower, 1994).

Of the variety of flavors of genre analysis, the most relevant definition for my study comes from the social constructionist perspective (Bazerman, 2004; Berkenkotter, 2002; Berkenkotter & Huckin, 2004). Bazerman, who has been particularly influential among scholars of this bent, defines genre as: “a broad rhetorical strategy enacted in a community to regularize transactions and create a particular kind of knowledge” (Bazerman, 2004, p. 14).<sup>2</sup> As Berkenkotter and Huckin (2004) remark: “Genres are ‘intellectual scaffolds on which community-based knowledge is constructed’” (p. 304).

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<sup>1</sup> Berkenkotter and Huckin (1995) call them genre systems; Spinuzzi and Zachry (2000) call them genre ecologies.

<sup>2</sup> Pare and Smart (1999) define genres as: “a distinctive profile of regularities across four dimensions: a set of texts, the composing processes involved in creating these texts, the reading practices used to interpret them, and the social roles performed by writers and readers” (p. 147).

Smart (2006), working in this tradition, defines discourse broadly to include language, thinking, believing, and activity, and includes genre practices as part of a group is shared symbolic resources. His long-term study (1998, 2006) of the intellectual collaboration among economists in a large bank demonstrated that epistemic discourse in professional organizations is often polysymbolic, including alpha numerical writing as well as other symbolic forms such as math, statistics, and diagrams.

Dannels (2000), who has applied genre theory to the study of engineering education, looks at other kinds of communicative genres, e.g., oral presentation genres, but points out that theories of writing applied to oral and by extension symbolic genres, might need some adjusting or testing.

There are three assumptions that I adopt from this body of work:

- Knowledge construction involves a process of interpersonal negotiation of shared meaning in groups
- Professional communities create specialized knowledge thru communicative/discursive practices
- Learning to be a member of a such a community requires learning its norms and genres (viewed as situated social practices)

**Assumption 1:** I adopt the rhetorical stance that knowledge is created through negotiation of shared meaning among members of a group rather than simply transmitted (Flower and social constructionists). This shared meaning is created by members of professional communities and or groups through their discursive/communicative practices broadly understood to include language, writing, and other symbolic resources.

This understanding led my research to focus on knowledge creation not as the production of external truths but rather of shared understanding of reality and of

methods grounded in shared practice. This framework allows me to attend to processes and products that are locally owned by the group rather than those intended primarily for dissemination to external audiences. Thus, I can show how tacit knowledge is externalized and made visible so that the group can get its work done.

**Assumption 2:** Professional communities create specialized knowledge through communicative/discursive practices. As Russell (1997) and others have demonstrated, genres permit professional communities to create specialized knowledge. By operationalizing necessary actions into genres, groups of people can act on common objects (Winsor, 2007). This is an important component of the infrastructure supporting collaboration.

**Assumption 3:** A further assumption is that learning to be a researcher requires learning the norms and genres of a professional/disciplinary community. Berkenkotter and Huckin (1995), writing about speech genres, characterize genre knowledge as “an individual’s repertoire of situationally appropriate responses to recurrent situations—from immediate encounters to distanced communication through the medium of print, and more recently, the electronic media.” (p. 20). In their studies of professional knowledge construction in academic contexts, they describe genre knowledge as a form of situated cognition: “... genres are inherently dynamic rhetorical structures that can be manipulated according to the conditions of use, and that genre knowledge is therefore best conceptualized as a form of situated cognition embedded in disciplinary activities” (Berkenkotter & Huckin, 2004, p. 285).

Writing about apprenticeship genres, Spafford et al. (2006) call such activities hybrid school/work genres, expanding on work by Dias et al. (1999) and Freedman et al. (1994). Early studies of hybrid genres characterized them as sites where activity systems conflict or view school genres as inauthentic reflections of workplace genres. Spafford et al. view these hybrid genres with their conflicting tensions as potentially generative, “accomplishing dual learning and professional purposes, but not without tensions” (p. 125).

The idea that these hybrid school/work genres are tools for bridging between conflicting positions, goals, and activity systems is central to my analysis. As Spafford et al. (2006) write:

*Symbolic and communicative tools such as apprenticeship genres appear to manage and mediate these concerns, but not smoothly and not without some unintended consequences. As symbolic tools, these school and work genres are often infused with tacit professional expectations that shape their users’ developing sense of professional identity (p. 122).*

In the next section, I turn to theories of situated learning and socialization to establish negotiations as important sites for studying meaning making in educational contexts. These theories turn our attention to the social interactions in learning contexts as well as the processes and products associated with group work.

### **3. Socialization and Situated Learning**

Hunter et al. (2007) describe community of practice theory as particularly appropriate for describing the processes of learning and growth that students go through in research experiences. Although this view of group knowledge construction

has similarities to the pedagogical genre studies described in the previous section, research based on a community of practice model identifies social interactions through observations and interviews rather than through observations of texts. Thus, Hunter et al. (2007) explain how novice qualitative researchers acquire competencies through working with expert members of a community of practice through a process of legitimate peripheral participation. Ramey and Turns (2005, 2006) also reference legitimate peripheral participation when characterizing the directed research groups in the Human Centered Design & Engineering Department. Sheppard (2009), writing about engineering education, states that situated learning is one of the most widely accepted models of how students learn tacit skills through working with experts and mentors.

According to Bourdieu and Wacquant (1992), qualitative research is a form of artistry. Schön (1990) and others have followed in this vein. It is commonly accepted that research, like other professional practice, is learned through a socialization process that involves a transfer of tacit knowledge. There are a variety of theories about learning and knowledge that explain how tacit knowledge can be made explicit. For example, knowledge management theories consider how knowledge in the mind gets externalized (Ichigo & Nonaka, 2007), whereas activity theory considers how knowledge is objectified (Engeström, 1987). My framework relies primarily on a situated learning model, which is central to communities of practice theory (Lave & Wenger, 1991).

The notion of socialization as a means of transferring tacit knowledge is also important in the classroom, particularly in courses designed to prepare students for professional practice (Dannels, 2000; Repko, 2008) and graduate education (O'Meara,

2008) for overview of socialization theories). Applying the notion of situated learning to engineering classrooms, Dannels (2000, 2008) demonstrates in her study of design critiques in capstone projects, that such learning proceeds through co-participation in authentic activities and experiencing disciplinary genres: "Students move from novice toward expert through co-participation with members of the disciplinary community" (p. 7). Such learning proceeds thru performance and engagement.

Participation, which is a key dimension of theories of social learning that inform communities of practice, raises the issue of roles and identity formation. In the classroom, role acquisition has been characterized as both a one-time event and a developmental process (Thornton & Nardi, 1975). Scholars in the field of genre studies have demonstrated that the norms and conventions of a professional community are reflected in the genres and communicative practices of the community and that genre knowledge is therefore a sign of learning. Furthermore, genre knowledge has important consequences for professional identity development (Spafford et al., 2006; Dannels, 2000).

Situated learning usually refers to the notion that learning takes place through an interactive process of engagement in social practices, which means working with other people, as well as tools, etc. A key aspect of situated learning is that novices interact with experts in active and engaged ways.

My view of practice fits in the situated learning camp, drawing on Schön's (1991) notion of expertise as artistry and the work of learning theorists and anthropologists such as Wenger (1998, 2000) and Suchman (1995), who demonstrated that work is a

socially constructed and situated activity. In these frameworks, practice is not just doing something, it has a historical and social context which gives structure and meaning to activity. Practice is not just the combined effort of individuals but rather a process of recursively constructing knowledge, activities, and artifacts in connection with other people, organizations, tools, and artifacts.

This view of practice is particularly relevant to the study of qualitative researchers because qualitative inquiry is: “a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible” (Denzin and Lincoln, 2005, p. 3). The next section describes the research groups in my study as instantiations of research based learning experiences. It also considers what is known about the value and benefits from these experiences.

#### **4. Research Based Learning Experiences**

Research-based learning experiences (RBLEs) are a subset of inquiry-based learning. They are constructivist pedagogies that emphasize student-centered experiences that directly engage learners through embodied activities. As Prince and Felder (2006) explain, they fall under the broad category of call inductive teaching methods. Such experiences are student centered (involve students taking responsibility for their own learning) and support active learning, primarily through processes of problem solving and asking and answering questions.

In her introduction to a special volume on research-based teaching, Kreber (2006) summarizes the numerous policy and research studies that have found “student-

focused, inquiry based learning to be a promising pedagogical approach to preparing students for the challenges associated with their future, professional, and civic lives” (p. 11). In general, scholars and policy makers have made very broad claims about the impacts of undergraduate research experiences on students’ learning and their futures.<sup>3</sup> Lopatto (2004b) summarizes the research as demonstrating that undergraduate research experiences promote intellectual skills such as inquiry and analysis, reading and understanding primary literature, communication, and teamwork. Students report gains in personal development such as growth of self- confidence, independence of work and thought, and a sense of accomplishment.

Many of these claims evoke values rather than empirically tested observations. Prince et al. (2007) examined the range of possible research experiences, e.g., teaching about research in a methods course or learning by doing, and reviewed a variety of empirical studies that examine the impacts of these experiences, focusing on engineering education. They found only two studies to support arguments that research supports cognitive gains. They concluded that undergraduate research does produce better learning when looking at pipeline outcomes, e.g., choosing a major or continuing to graduate studies.

For the most part, learning has been treated superficially in these studies. There is a small but growing body of empirical studies that investigate research-based teaching (not learning) as instances of problem-based learning and consider what constitutes

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<sup>3</sup> Undergraduate research experiences are considered high impact educational experiences based on students responses to the annual National Student Engagement Survey (Ku and Schneider, 2008; AAC&U, 2007).

effective teaching practices in this context. Much of this work has focused on the teaching-research nexus, that is the relationship between an educator's teaching and research experience and how that relationship affects student learning outcomes (Hattie and Marsh, 1996; Healy, 2008; Griffiths, 2004; Prince, Felder & Brent, 2007). What is lacking in these studies is the context or nature of these experiences from the student point of view.

For example, Seymour et al. (2004) found only two U.S. studies on the student experience in participating in undergraduate research. In a review of current literature on the impact of undergraduate research, Crowe and Brakke (2008) list only 10 studies on the student experience. They found the research to be suggestive, but incomplete, and lamented that reports in many cases are anecdotal and the likelihood of self selection bias among the students is large. Students and faculty universally report such experiences as enjoyable and valuable. However, Crowe and Brakke (2008) conclude: "While we see much activity surrounding URE [undergraduate research experience], there is less tangible evidence and research addressing the value provided in ways that can be effectively shared" (p. 50).

In order to understand what constitutes effective practice in research experiences, Hunter et al. (2007) call for research-based evidence that describes the student experience, the intellectual and personal gains associated with participation, and the educational processes that contribute to those gains. Their (Seymour et al., 2004) study of faculty mentored summer research experiences at liberal arts colleges identified significant processes that shape outcomes for students, particularly the

opportunity to work closely with faculty mentors (and continuing those relationships) and the professional development opportunities associated with presenting the results of their work at conferences and other venues. They acknowledge that their outcomes represent the “best case” scenario, since they investigated elite programs. However, they found “broad agreement” with their stronger gains in other studies (Hunter et al., 2007, p. 72). However, they call for additional research to identify the variations in undergraduate research participation at other types of institutions and the experiences and outcomes for different groups of students.

One issue raised by these studies is that the focus on discovery or frontier research, in which the summer undergraduate laboratory experience is the gold standard, might limit their availability. One can imagine as does Healey (2006; p. 71), that the broader the definition of research, the easier it would be to incorporate research experiences into a variety of teaching and learning activities. However, in reviewing the various studies, Prince et al. (2007) found that the major limitations to providing undergraduate research experiences “are [lack of] resources and the rising expectations for faculty research productivity” (p. 288).

Despite the fact that shared participation between teachers and learners is considered essential in RBLEs, they are not studied as a group phenomenon. In particular, there is a lack of understanding about the nature of learning through participation, not just learning by individual doing, or collaborative learning in general. As Flower (1994) points out, it is not the instructional mode that is most important, it is the type of social interaction (p. 206). These dynamics are explored in this study.

## HCD&E Research Groups

Directed research groups (the setting for my study) have been reported on in a variety of forums, including two articles published in *Technical Communication*, one student led (Larson et al., 2009), one faculty led (Turns & Ramey, 2006); a conference paper (Turns, et al., 2005); and an unpublished technical report about the first qualitative data analysis research group offered in the HCD&E department in Fall 2004 (Turns, 2004).

Representatives of the department have taken the stance that directed research groups can balance both production and learning goals, thus, making them more attractive to busy faculty who are already balancing teaching, research, and service loads. Turns and Ramey (2005) state that “directed research groups help us, teachers and students working collaboratively, to achieve both goals of learning and scholarly productivity” (p. 296). Furthermore, they are characterized by shared participation in knowledge construction, representing a more student-centered pedagogy.

Although the content and format of activities varies by member interests and faculty research priorities, what directed research groups have in common is a focus on learning to do research by doing it. They are not structured as a course, can last one or many quarters, are for-credit but not graded, have variable credits, and most importantly engage participants in vertically integrated work with other students and professionals (participants of various educational and mastery levels, including undergraduates, masters, and doctoral students) on authentic research activities, including research design, data collection and analysis, and writing papers and

presenting at professional conferences. These research groups reflect the range of possible research-based teaching approaches outlined by Healy (2006)<sup>4</sup>; the two SEED groups in my study were highly scaffolded, facilitated group experiences that were both production and learning oriented.

Directed research groups are framed as authentic educational experiences because of their experiential and project-based approaches, and are intended to transition students to the workplace and professional practice. The host department has a combined disciplinary and professional preparation goals. It is a multidisciplinary department with a curriculum and research activities that are design and practitioner oriented, combine social science research with interpretive methods from the humanities, and range in subject areas from cultural identity to effective engineering education practices.

To date, there has been no formal assessment of these research groups although they are required in the course of study at the undergraduate and graduate level. Turns and Ramey (2005, 2006) outline several dimensions for distinguishing between such groups, including how goals are established for the group (e.g., faculty versus student driven) and how much of the research life cycle they span (e.g., cradle to grave or only data analysis). They discuss the challenges of learning to do qualitative research as well as learning to do research by doing research. These challenges, and also tensions

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<sup>4</sup> Healey adopted (Griffiths, 2004) taxonomy and created a quadrant diagram, which emphasizes whether the research experiences are teacher or student-centered. Such teaching can be:

- *Research-led*: structured around subject content; students learn about research
- *Research-oriented*: curriculum emphasizes how knowledge is produced in the field
- *Research-based*: largely designed around inquiry-based activities, rather than content
- *Research*: systematic inquiry into the teaching and learning process itself.

described by students, were attributed to students' lack of experience, mismatches between educator and student schema about what kind of event they were engaged in, and mismatches between expectations of students with industry experience and what was expected in academic learning situations, as well as skills issues such as lack of vocabulary, how to work with large data sets, etc.

## **5. Coding as a Site for Negotiation**

Flower (1994) suggests that negotiation moments are likely to be brief in learning contexts. However, because both SEED groups were large in terms of research groups (9-12 participants), there was bound to be numerous sources of tensions and disagreements. Coding and code book creation in the two SEED groups in my study involved an iterative process of deductive and inductive coding, reconciliation, reliability checks, and other types of knowledge negotiation. Because the coding approach used measures of agreement between multiple coders, the potential for disagreement and the need for negotiated activities are high. Furthermore, there were a variety of tensions associated with competing goals for producing and learning and differences in disciplinary norms and practices for doing research.

The coding approach is described in more detail in Chapter 4. It is a particularly good example of combining theory and method, the praxis that Sullivan and Porter (2004, originally 1993) advocate for.<sup>5</sup> This type of coding does not fit with more static

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<sup>5</sup> They define praxis using the language of negotiation: "Praxis refers to a type of conduct that negotiates between positions rather than grounding itself in any particular position" p. 302.

and conventional descriptions of the process of coding.<sup>6</sup> It is not the only approach to coding in the HCD&E department (see Thayer and Evans, 2007, for a more traditional quantitative approach). However, it is an approach that is prevalent in the local engineering education research community associated with the department.<sup>7</sup> It can be seen as a genre, i.e., an example of Miller's (1994) typified social action.

This community was represented in my study groups by members of the management teams (professional staff and several students, see Chapter 3). Further, the development of this particular coding approach can be traced over the course of five years through the offering of at least five separate directed research groups doing qualitative analysis in which the lead faculty from the SEED groups was a participant or leader. The end result was quite divergent from the origin point: a hybrid inductive and deductive approach rather than the grounded theory approach used in the first groups.

This approach has been shown by Scott et al. (2001) to work effectively with novice researchers and to have important learning outcomes for undergraduates "due to the constant interplay between working with the faculty lead, individually, and with peers" (p. 2). In their study of student coders, Scott et al. found that students learn from other people, but also through other resources, e.g., codes and the application of

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<sup>6</sup> For example, in her classic book on content analysis, Neuendorf (2002) provides a flow chart (without iterations) for "How Content Analysis is done" and states that "an a priori coding scheme describing all measures must be created" (p. 50). Although in quantitative analysis methodologies, coding is often viewed as indexing or labeling, according to Miles and Huberman (1984), qualitative coding is a systematic way of conducting iterative reflection and involves meaning making. Citing Bliss, Monk, and Osborn (1983), they state a word or phrase does not contain its meaning, but "has the meaning it does by being a choice made about its significance in a given context (pp. 56-57). For more on coding see Martin and Hammersly (1994) the functions of coding and DeWalt and DeWalt (2002) on ethnographic coding as a process of moving from etic (theoretical) to emic (local) categories.

<sup>7</sup> I conducted informal interviews with research scientists in CELT. I found similar approaches to coding in the work of Geisler (2004) and others who trace their roots to content analysis and discourse analysis but also work in engineering education contexts.

the codes, mediated by language and other tools. They write that: "Students gain mastery of problem solving tasks that are actively structured by someone in the community to which the student aspires to gain entry" (p. 2).

As Geisler (2004) demonstrates, coding verbal data is inherently difficult because of competing methodologies, different understanding of the role and nature of language in human behavior, and the fact that meaning is so context bound in verbal interactions. She states that, "When faced with a stream of language, many researchers despair of seeing any regularity to verbal data. Words, it is often assumed, are too mushy and soft to support reasonable claims" (p. xii). Furthermore, she cautions that reliability measures have as much to do about the validity of the researcher as an instrument of data collection as about the data. This proves to be an important point in my interview analysis.

Reflexivity, according to King (2004, p. 20), involves the recognition that the researcher's involvement in the research process shapes the nature of the process and the knowledge produced through it. This important norm of qualitative inquiry emerged as part of the negotiations in the research groups. The outcomes associated with student participation in coding activities are discussed in Chapter 6, following a genre analysis of the activities and artifacts of the two groups in Chapter 4, and a more targeted negotiation analysis in Chapter 5. Together these analyses reveal that the negotiated activities associated with the development and use of a coding protocol result in artifacts and material practices that are the infrastructure supporting the intellectual collaboration of the groups.

## **Chapter 3**

### **Study Design and Methods**

I begin this chapter with an epistemological note, which continues some threads from Chapter 2, acknowledging the fact that I draw on methodological approaches and techniques from both empirical and interpretive traditions, with a strong focus on naturalistic inquiry. Next, I provide an overview of my study design and describe the setting, data collection and archiving methods, and analytic approaches for the three analysis chapters. I conclude with checks for rigor.

The details of the setting given here provide context for the characterization of directed research groups in Chapter 2 as instances of research based learning experiences (RBLEs) and leads to the specific activity and use contexts of coding and article writing investigated in Chapter 4. This is the “within context” detail which is critical for understanding the study’s potential significance as an instrumental case study, which according to Stake (2005, p. 237) is intended to provide insight into an issue or refinement of a theory. My intent is to provide insight into the inner workings of directed research groups as well as the role that negotiation might play in intellectual collaboration. The larger goal is to contribute to a better understanding of the gains and processes related to the intellectual development of student participants in the groups (Hunter et al., 2007).

#### **1. Approach**

The study adopts an ethnographic approach, acknowledging the larger culture in which the research groups take place, the local context and practices of the groups, and

the experiences of participants. I followed Graham Smart (1998, 2006) in his use of interpretive ethnography to study knowledge making practices in a group, what he calls intellectual collaboration. His long term research of the epistemic practices of economists in a bank adapted Geertz's (1983) methodology for doing interpretive ethnography to include central concerns of genre and rhetorical theory. Smart (1998) describes the researcher's task as follows:

According to Geertz, the researcher's task is to take informants' experience-near concepts and "place them in illuminating connection" with the "concepts theorists have fashioned to capture the general features of social life" in order to produce an interpretation of the way a people lives...The result is an account of the community's meaning-making activity (p. 113).

This commitment to representing participants' understanding of reality (Silverman, 2001) and the relationships of material practices to a larger culture is consonant with what Bransford (2005) calls "within context" studies in educational research.<sup>1</sup> Educational researchers who follow more quantitative positivist practices tend to overlook the fact that the classroom is a context, according to Bransford. He notes the contribution to the Learning Sciences of situated/informal learning researchers such as Jean Lave (1988) and Sylvia Scribner (1986) as reminding us that the classroom, like other informal educational settings, is a context.

Despite the fact that the post-social theorists in North American genre studies distrust the notion of context as overarching analytical categories, Spinuzzi (in press) provides a work around, suggesting that in order to study context, you need to have at

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<sup>1</sup>According to Stake (2005), a qualitative case study is "both the process of learning about the case and the product of our learning (p. 237)." According to Rentz (1999), a case study is characterized by a focus on an entity in its natural setting.

least two instances, the context is revealed in the differences. Following his approach, I conducted a comparative analysis that entailed reviewing the documents and other information available from previous qualitative data analysis (QDA) groups, with a more substantive comparison of the two SEED groups, in order to identify the differences that matter for my research questions. The analysis of the coding and article writing activities is detailed in Chapter 4.

The underlying assumptions for the interpretive side of my analysis are discussed in Chapter 2. However, I want to re-emphasize the importance of materiality and specifically the applications of genre analysis to surface information about how people use artifacts in context. As Smith and Schryer (2008) point out, ethnographies and case studies generally view textual and other artifacts merely as sources of information. In genre studies, there are assumptions about the mutually constituted relationship between discursive practices and culture, as well as the role of texts as links in chains of communication (Faigley, 1981, 1986; Odell, 1981).

In the social school of genre studies, the analyst views textual and other artifacts as traces of human activity, i.e., the activities that generated them are inscribed in the material artifacts. In some instances, the conditions of use are also inscribed in the artifacts, in others the conditions of use have to be reconstructed through interviews or other sources. My analysis required looking beyond what texts mean to “what they do and how they mean” (Bazerman, 2004, p. 8). Thus, the analysis of the artifacts in Chapter 4 leads to a further investigation in Chapter 5 of how they were developed and used, and the role that negotiation played in that process.

## 2. Study Design

I did not participate in either group as an ethnographer but rather as a novice qualitative researcher in the first group and as a developing educator in the second group who was interested in how to manage such a group. When the opportunity arose to conduct a retrospective analysis of the research group, I started with the general question of: What was different about this research group? What made it feel more successful? My first pass was essentially to reverse engineer the group, recreating the activities through the artifact trail created by the group, then to use the insights to search out the larger context and to probe in interviews for the meaning of the experience to the participants, as Silverman (2001) prescribes.

My analysis adopted Smart's (1998, 2006) interpretive ethnographic approach. Smart combined linguistic, theoretical, and observational investigations with textual analysis to study intellectual collaboration. In addition to the those three types of investigation, I added analytic analyses of negotiations and interview themes as explained in Sections 6 and 7 of this chapter.

My study design entails a series of linked analyses of the research groups, from the point of view of the group for both SEED groups and individual participants for the second research group only. The reason for the asymmetry is that there was little negotiation in the first group as explained in Chapter 5; furthermore, most of the participants in the first group weren't available to be interviewed.

I did not begin the study with a focus on negotiation. Rather, I began my analysis with a general comparison of the two groups. My initial research questions were:

**RQ1. What are the differences that matter between the two groups in the material practices associated with coding and article writing?**

**RQ2. What do the artifacts produced by the groups reveal about tensions related to learning to do qualitative data analysis?**

Having developed a negotiation framework, I addressed the following research questions:

**RQ3. What does the lens of negotiation reveal about the types of task-related group processes that occurred in the two groups?**

**RQ4. What do the interviews reveal about individual participants' experience of these task-related and possibly other types of negotiation?**

Data were collected through a variety of methods including participant observation, review and inventory of artifacts generated by the groups, retrospective formal interviews with participants, and informal interviews with members of the wider research community. There are three analysis chapters: Chapter 4 focusing on materiality (genre analysis); Chapter 5 on group processes/participation (negotiation analysis); and Chapter 6 on individual experience (thematic analysis of interviews), respectively. Each reveals a different aspect of the negotiations involved and contributes to a richer understanding of the processes and learning outcomes associated with intellectual collaboration in the two groups.

### **3. The Setting**

The setting includes the host department and two overlapping and emerging

research communities related to qualitative data analysis associated with the department and its affiliated faculty. The more immediate context for the study of the two directed research groups includes the participants, the data set and coding approach used, as well as the format and pedagogical strategies used by the faculty lead for the research groups. This context is touched upon in this chapter and elaborated in Chapters 4 and 5, since much of the context is revealed through the analysis.

Directed research groups are a pedagogical innovation associated with the department of Human Centered Design & Engineering (HCD&E; Turns & Ramey, 2005, 2006). The department is housed in the College of Engineering at a public research extensive university. It offers undergraduate and graduate degrees, including the PhD, as well as variety of professional certificate programs. It is bifurcated by daytime (full time) and night time master's programs (for working professionals). These two tracks are normally separated because of different tuition rates and funding streams. However, most research groups accommodate night time students.

The department is known for the variety and extent of research activities that are available and required in the curriculum. It has a growing reputation because of its attraction of new faculty and new research funding. It recently went through a 10-year review process which partially initiated a rebranding from Technical Communication to HCD&E. The faculty composition has always involved a mix of quantitative and qualitative researchers from a variety of disciplines. Thus, the research paradigms have been eclectic. In the past, partially because of this mix of epistemologies, and because of resource limitations associated with the small faculty size, the required core methods

course was called “Empirical Methods.” A single other methods course focused on experimental design. Thus, directed research groups were a way of providing methods training as well as being a discount method of providing authentic research experiences to students in the department.

Although the content and format of activities varies by member interests and faculty research priorities, what directed research groups have in common is a focus on learning research by doing research. Turns and Ramey (2005, 2006) describe the characteristics of these “curricular innovations”: They are structured as a course, can last one or many quarters, are for-credit but not graded, and have variable credits. Most importantly they engage participants in vertically integrated work (with other students and professionals) on authentic research activities. Activities might include research design, data collection and analysis, and writing papers and presenting at professional conferences.

When instituted, there were only a few sponsored research projects that were housed in the department, so many of the groups were initiated by faculty with a general theme or research focus, but were negotiated among the participants. Directed research groups are now a mainstay of the HCD&E experience, being required for all levels of students, undergraduate, master’s, and doctoral students. Some groups have continued for years.

With the addition of three new faculty to teach courses in 2009, the variety of methods courses has increased rapidly. During the 2009-2010 academic year, when I was collecting and analyzing my data, a qualitative methods course was offered for the

first time. Similarly, the opportunities to participate in sponsored research, and to be paid for that participation, have increased. Thus, directed research groups are at an interesting intersection. Curriculum requirements have changed, other research methods offerings have increased, the variety of faculty research and experiences had increased in terms of discipline of origin and methodological preferences, and the opportunities to participate in externally funded projects, and to be paid for the participation, have changed.

#### **4. Rationale for Selecting the SEED Groups**

The two research groups in my study were both associated with the Study of Engineering Educator Decision-making (SEED), an ongoing study funded by the National Science Foundation through the Center for the Advancement of Engineering Education at our university (see Atman et al., 2010, for CAEE Final Report. Each only lasted a single academic quarter with once weekly meetings. Both were involved in the laborious process of coding qualitative interview data, using the same (already collected) data set, for a larger externally funded study. The groups were similar and different in interesting ways, as summarized in Table 3-1 and discussed in Chapter 4. These two groups were in part a convenience sample. They were also particularly rich sources of interesting data because of their size, the diversity of participants, and the intensive use of tools and generation of artifacts.

Both groups were led by the same instructor of record, called the faculty lead in this study. This individual, a tenured professor in HCD&E, has a strong track record in

**Table 3-1. Summary of SEED Groups**

<b>Dimension</b>	<b>Research Group 1, Spring 2007*</b>	<b>Research Group 2, Autumn 2008*</b>
<b>Participants</b>	2 UG, 2 G, 2 PhD, 2 Research Scientists, 1 Faculty Lead/PI, Me—remote participant (9 total)	4 UG, 3 G, 2 PhD (1 English), Faculty Lead/PI, Consultant—remote participant, me (12 total)
<b>Goals of Analysis</b>	“Bubble up” ideas, sense of what in the dataset	“Crunch mode,” produce results, write articles
<b>Methods</b>	<p>Object of analysis was interview/person. Attempt to create personas through pseudonyms and characters</p> <p>Whole transcripts used; participants responsible for difference transcripts (divide and conquer)</p> <p>Grounded theory, divergence and convergence exercises</p> <p>No overarching theoretical lens</p>	<p>Object of analysis is motivation and difference. Unit of analysis is turn-taking events</p> <p>Paper transcripts; spreadsheets primary analytical tools; code book was developed through iterative process</p> <p>Hybrid inductive/deductive analysis; reliability negotiations with all 10 coders on 4 transcripts; paired coding for other 27</p> <p>Theoretical framework for motivation; <i>difference emergent theory</i></p>
<b>Work Products</b>	<p>Coding scheme for two dimensions: focus of the decision and real world</p> <p>15 transcripts coded</p>	<p>Two code books for motivation and difference; templates, reflections, preliminary results for prevalence</p> <p>All 31 transcripts coded (1,000 plus pages)</p>
<b>Dissemination</b>	<p>Reported as cases/stories in poster and conference papers</p> <p>Student led article 2009; final NSF center report 2010</p>	<p>Conference papers in subsequent quarters 2009. Journal article in preparation; poster proposal; master’s thesis and doctoral dissertation in progress. Summarized in final center report to NSF in 2010</p>
<b>Research Dimensions</b>		
<b>My role</b>	Remote participant via teleconference and email	Participant/observer, but also developing skills in managing research group
<b>Artifacts</b>	Agendas, emails, reflections, GoPosts* and wiki entries, raw and coded transcripts, spreadsheets; my meeting notes, posters, conference papers	Agendas, white board notes/photos, code book iterations, reflections, GoPosts, raw/coded transcripts; spreadsheets; lead faculty process summaries, my meeting notes and observations
<b>Activities/Artifacts</b>	First training exercises, code book development, reliability exercises, individual reflection written reflections, collective brainstorming and categorization	First training exercises, code book development, reliability exercises, individual written reflections, collective brainstorming and categorization

\*UG=undergraduate, Grad=Master’s; GoPost=the university’s electronic message board tool.

combining pedagogy and research activities. She has developed a particular approach to conducting collaborative qualitative research that is systematic, auditable, and transparent. The coding approach that matured over the course of the two groups was inherited from the Center for Engineering Learning and Teaching (CELT), with which the faculty lead is affiliated, and embodies norms and practices of the larger engineering education research community. The faculty lead has been a champion for for-credit directed research groups and written several scholarly publications that raise issues about how to conduct such research groups that inform this study (Turns & Ramey, 2005, 2006; Turns et al., 2004).

There are also pragmatic reasons relating to access and domain knowledge for studying these two groups, following the Loflands' (1995) exhortation to "start where you are." Because I was a participant-observer in the two research groups, I have both access to the participants and a deep understanding of the setting, activities, and participants, as well as the larger culture of the research in this particular department. My role and mode of participation varied in the two groups. In the Spring 2007 group, I participated via telephone from out of state. The faculty lead and participants made a number of accommodations to keep me integrally involved with the group and to make group activities visible to me. These efforts resulted in an archive of documents that include detailed notes of each session, as well as the artifacts that were shared via email and on GoPosts (the university's electronic message board tool) and Wikis.

In the Autumn 2008 group, I was a research assistant tasked with assisting the faculty lead in managing the group and the associated research activities. I also was

involved with the management team subgroups that met outside the weekly group meetings to work on conference paper proposals and journal articles. These activities involved significant additional data analysis as well as synthesis of results and reflection on the process.

It is important to note that the research groups took place within the context of the larger ongoing SEED study; thus, the activities of the management teams continued in subsequent quarters of the same academic year. This case study focuses on the quarters in which the groups took place, in order to generate a bounded phenomenon per case study methodological stance (Creswell, 1998). Thus, the continuing coding and article writing activities are not explored here.

## **5. The Participants**

As shown in Table 3-1, there were 9 participants (6 students) in Group 1 and 12 participants (10 students) in Group 2. In total, three people participated in both groups: one undergraduate from Group 1 participated in Group 2 as a master's student; one PhD student (me) participated in both groups, as did the faculty lead. All students took the research group for credit but were not graded. The total number of credits varied, but most students took it for 2 credits.

The paid staff constituted the core "professional management team" in both groups. There were three professional staff, the faculty lead and two research scientists, and one undergraduate research assistant (URA) in Group 1. The faculty lead and a part-time graduate research assistant (me) were paid staff in Group 2; the visiting

engineering educator, who was on sabbatical from another university, was paid under a short-term contract to work on the analysis. The URA from Group 1 participated on the management team in Group 2 in order to work on her master's thesis. She took the lead on developing one of the two code books emerging from Group 2. In the subsequent quarter, she enlisted help from a volunteer graduate student and worked in parallel with the management team which continued to work on motivation coding and article writing.

Section 7 below gives more detail on participants who were interviewed. The fact that both groups included a relatively large, diverse mix of participants, including students, faculty, and other professional staff, was an additional reason for choosing these two groups for my study.

## **6. Genre and Negotiation Analysis**

The genre and negotiation analyses entailed an iterative set of investigations, as described in Figure 3-1. The details of the analyses are explained in Chapters 4 and 5, respectively. Figure 3-1 on the steps in the analysis and Table 3-2 on the genre inventory for Group 2 are included here primarily to demonstrate the scope of the analyses and provide an audit trail. They cannot be fully understood without having read the analysis chapters.

There are two types of documents involved in this study: the documents that provide background and context and documents that relate to my research questions,

### **Figure 3.1 Steps in the Genre and Negotiation Analysis**

#### **Round 1 Genre Analysis:**

1. Data collected through participant observation in two research groups (10+ weeks, Spring 2007 and Fall 2008 quarters)
2. Collected and archived artifacts produced by group and my observation notes
3. Selected key artifacts related to coding and article writing for interviews
4. Inventoried and categorized artifacts for Group 2, noting when produced, who involved in the production, whether they primarily supported learning or production objectives (see Table 3-2 Genre Inventory)
  
5. Review of artifacts (particularly my notes, agendas, and GoPosts) for:
  - a. Incidents that signaled significance (checkpoints goals, biases, SWOT exercise, take-aways)
  - b. Recurring themes and patterns related to my research questions
  
6. Review of activities and products at Wks 1, 5, and 10 for initial assessment of “productivity”/process and for differences between two groups that matter
7. Compared two groups on development/timing of code book and reliability checks.

The following activities aimed at synthesis also included results from early interview analysis:

8. Wrote memos on differences that matter, cast of characters
9. Wrote vignettes incorporating my impressions with “data”—written from participants’ perspective. (Per Erickson, 1986, vignettes are means of testing assertions); vignettes provide details of the case in the final write up

#### **Round 2 Negotiation Analysis (focus on activities/processes)**

1. Developed a negotiation framework (see Chapter 5)
2. Used my negotiation framework (coding scheme) to identify points of negotiation in the two groups
3. Characterized the first group as the low negotiation group (LNG) and the second group as the (HNG)
4. Wrote up accounts of negotiation associated with coding and article writing
5. Identified key points of negotiation in the HNG to illustrate

**Table 3-2 Genre Inventory for Group 2 (excerpt)**

Schedule Autumn 2008	Phase	Artifacts Created During Week		Artifacts Created in Group/ Revisions	Weekly Meeting Activities
		Mgmt Team*	Students		
<b>Week 1 (9/25)</b>	Ramp Up Training		GP Take- aways	WB How, Observations	Orientation
<b>Week 2 (10/2)</b>	Ramp Up Training	M 0 protocol 10/7	GP Biases; How Framing	WB SWOT, WB Notes Difference	Introduction to plan; SWOT; Three groups TPS
<b>Week 3 (10/9)</b>	Reliability, Code Book Development	CB-M 1 10/14, CB-D 1 10/14, CB-D 2 10/15		WB photo Uberreliability WB Notes Synonyms M	Uberreliability on Difference Handout; Intro of Motivation Code Book
<b>Week 4 (10/16)</b>	Reliability, Code Book Development	RR to GP 10/22	Nathan/Bea M Codes	WB Notes on M	Motivation Ex 0.5
<b>Week 5 (10/23)</b>	Code Book Use, Reliability	CB-D 3 10/23; M Process Summary; CB-M 2 10/24	Nathan/Bea D Codes; Results/Reliabi lity	G code 11/21	M Document the Process; Nathan/Bea
<b>Week 6 (10/30)</b>	Code Book Use, Reliability	CB-D 4 10/30			Midterm Check (Lead faculty gone); update on difference coding
<b>Week 7 (11/6)</b>	Code Book Use, Reliability	CB-M 3 11/6	Neal/Simon D Codes; Neal/Simon M Codes; Results/Reliabi lity		Challenges in coding motivation; Keith/Simon
<b>Week 8 (11/13)</b>	Coding, Interpreting Individually; Reliability in Pairs		2x12 Codes		Keith/Simon interpretations; Reliability-- inclusion
<b>Week 9 (11/20)</b>	Coding, Interpreting Individually; Reliability in Pairs	CB-M 4 11/20	Interpretations		Discuss sense of participant; Review final steps and assignments
<b>Week 10 (11/27)</b>			Final 15 Codes; Interpretations		Thanksgiving
<b>Week 11 (12/4)</b>			Elevator Speech		Sharing of write ups

**\*Versions of code books for motivation (CB-M) and difference (CB-D)**

the data sources, i.e., the code books and research results. The documents and other artifacts that I collected reflect the activities associated with the weekly meetings of the groups and online interactions that occurred during the first group (Spring 2007) and the second group (Autumn 2008). These activities produced a set of artifacts including: coded transcripts, reflective narratives, messages sent via email and posted to Wiki and GoPost forums. The online element is key in both of these groups, but is not the focus of this study. However, because of the extensive use of online tools, there is an already archived set of artifacts that I draw on. In addition, the instructor materials and research assistant observation notes were analyzed. Other materials consist of work group public products, such as conference posters and papers and journal articles.

My primary data source for Group 1 was the Technical Report prepared by the research scientists after the group concluded (Turns et al., 2007). This technical report assembled all the GoPost and Wiki postings as well as email threads, some of which were only available to the management team. This technical report yields insights into the working of the management team, which were invisible to me while I participated in the group. The textual archive is particularly complete, including detailed notes of conversations in each group meeting, as well as reflections on process and outcomes. For the second group, I had to compile my own archive. Rather than create a technical report, I conducted a genre inventory as illustrated in Table 3-2.

In tracing the origin of the coding approach, I found that negotiation of differences has consistently served as an effective tool in a variety of research-based learning contexts. Thus, I focused primarily on the second group in the subsequent

analysis, which unpacks the role of negotiation as seen from the group view and the individual participants, in Chapters 5 (both groups) and 6 (group 2 only), respectively.

The reasons for this asymmetry are partially pragmatic. It was difficult to get access to the participants in Group 1 and I found that the time lag meant that people really didn't remember much about the group. However, there is some overlap in the groups as explained in the section on participants so the first group was represented. The more compelling reason to focus on Group 2 was because of the prevalence of negotiation in this group, as I explain in Chapter 5.

## **7. Interview Analysis**

Members two SEED research groups were invited to participate in follow-up interviews focused on the educational and pre-professional impacts of participation in the research groups. The interview study design and instruments were approved by my university's human subjects division. This study was deemed exempt because it consisted of a study of educational practices. Nonetheless, I took the standard precautions to guarantee confidentiality and anonymity, including properly consenting interviewees. The approved recruitment message, consent forms, and interview protocol are attached in Appendix A.

### **Interviews—Data Collection**

In total I conducted 10 interviews as shown in Table 3-3. The students who graduated did not respond and the research scientists from the first group had moved on.

**Table 3-3. Participants in Interviews and Others Cited\***

Participant #	Level	Pseudonym	Int Date	Transcribe date
<b>Interviewed</b>				
0	PhD	Me	6/8/09	-- Test
1	Faculty	Frank	6/19/09 Telephone	RD 5/9/10 RD 7/3/10
2	UGrad	Nelda	6/22/09	KG 4/5/10
3	Grad	Gail	6/25/09	KG 4/6/10 KG 4/13/10
4	Grad	Glenda	6/26/09	RD 4/5/10
5	PhD	Delilah	6/29/09	RD 5/9/10 RD 6/29/10
6	Group 1	David	7/9/09	-- GP1
7	Faculty lead	Felicia	7/10/09	KG 5/20/10
8	Group 1	Daren	8/21/09	--GP1
9	PhD	Dana	8/26/09	RD 5/9/10 RD 7/15/10
10	UGrad	Nathan	9/28/09 Telephone	RD 4/5/10
<b>Not Interviewed but Cited/Mentioned in Narrative</b>				
11	UGrad	Nora		
12	Grad	Greg		
13	UGrad	Naomi		
14	ResScientist	Rosalyn		--GP1
15	ResScientist	Randi		--GP1

\*Participants 0, 6, and 8 not included in Chapter 5 analysis; naming convention—first letter corresponds to level. RD=Coder; KG=Me.

I was not able to interview either of the evening master's program students or the undergraduate from Group 1 who went on to work in industry, despite sending them several requests for interviews. My recruitment message indicated that they were free to decline participation.

One person I did not interview was the student who quit the first group because he was not available. Although there were different explanations given by people about his reasons for quitting, mostly having to do with workload issues. However, he quit before the coding schemes were fully negotiated and did not participate in the actual transcript coding or article writing.

The interviews were particularly useful for reconstructing the events from the first group. In testing the interview protocol, I had a CELT research scientist who was familiar with the larger study and these research groups somewhat interview me about the first group so I could assess how difficult recall might be and how well the artifacts I chose were able to stimulate recall. I interviewed the two participants, the faculty lead and the undergraduate now graduate who had participated in both groups. These interviews confirmed my notes and remembrances and flushed out the technical report for that group.

Each interview lasted approximately 1 hour (the interview with the faculty lead was 2.5 hours long) and was audio taped. I also took hand written notes during the interviews. Because these interviews covered a wide number of questions that might possibly inform the participants' experience, this analysis could lead to more extensive analysis of these interviews in the future.

### **Interviews—Analysis**

Figure 3.2 details the steps in the two rounds of analysis of the interview data. The details of the analyses are given in Chapter 6. Figure 3-2 is included here to

demonstrate the scope of the analysis and to provide an audit trail. As a first slice, I kept notes and memoed after the interviews were conducted (Halcomb & Davidson, 2006; Seidman, 2006; Silverman, 2001; Weiss 1994). I then went back and time stamped my notes and transcribed selected portions, relating to take-aways, challenges, contributions, roles, over experience, understanding of research.

### **Figure 3.2. Steps in the Interview Analysis**

#### **Round 1 Analysis: Interpretive (during interview and review of notes)**

1. Checked my observations (member check); probed for puzzling issues regarding tensions
2. Probed for differences between two groups
3. Tested importance of code book and negotiation (unprompted and prompted recall), other group dynamics, successes/challenges and roles.
4. Compared interview responses (retrospective) with participants' public reflections during the research group.

#### **Round 2 Analysis: Thematic Analysis of Transcribed Segments**

1. Coded for themes related to understanding of research, learning outcomes, role of negotiation
2. Created matrices of results; wrote vignettes

On a second pass, I focused on coding and article writing with particular attention to mentions of negotiation and how the code book helped. I had help with these transcriptions. Pseudonyms were assigned to the participants. The interview segments quoted in the analyses chapters were lightly edited for readability. For example, "uhs" were deleted. Pauses and other nonlinguistic features were not captured. I reviewed all the transcriptions done by my helper, and listened to those portions of the audio tapes as a quality check. I also asked her to go back and flush out segments that proved to be relevant in light of the subsequent focus on negotiation,

since some transcribed segments were paraphrases. I also consulted with my interview notes as a memory and quality check. These notes were particularly useful in indexing the transcripts.

The SEED research groups might have been the first experience most students had had with qualitative research. But by the time I interviewed the participants, several students had moved on from being undergraduates to graduate students and progressed in their course of study. Several of the participants were taking the three research classes the quarter after Group 2, including empirical methods, qualitative methods, and research design—all offered at the same time. This might be seen a confounding factor. However, it also permitted time for them to integrate the earlier experience and compare it with the truth of their more recent experiences, leading to more rich reflections.

The analysis of the interviews is discussed in Chapter 6. I only analyzed the interviews with participants from the second group to answer my research questions. The interviews were designed both to illuminate the participants view of the coding and article writing activities as well as elicit their overall experience. This analysis was limited by the focus of this project, but could eventually lead to a larger study of students' research experience in this setting and set the stage for an evaluation of the effectiveness of RBLEs.

## **8. Sources of Rigor**

My three-part study design allows both triangulation of data sources and

analytic approaches, which has the benefit of providing a deeper understanding of the case as well as improving rigor by compensating for the inherent biases in specific data collection and analytic methods and what Yin (1998) calls “sources of evidence” (p. 231). Overall, my study incorporated all the strategies for enhancing rigor in qualitative research as outlined by Devers (1999) as shown in Table 3-4. The criteria were taken from Lincoln and Guba (1985). For example, Figures 3-1 and 3-2 in Section 6 + 7 of this chapter provide an audit trail for my analyses, contributing to dependability.

**Table 3-4. Strategies for Enhancing Rigor (adapted from Devers, 1999, p. 1171)**

<b>Criteria</b>	<b>Source</b>	
1. Credibility	Triangulation: Multiple data collection and analysis methods	X
	Search for disconfirming evidence	X
	Member check	X
2. Transferability	Detailed description of context	X
3. Dependability	<b>Data archive/audit trail</b>	<b>X</b>
	<b>Peer review</b>	<b>X</b>
4. Confirmability	Triangulation	X
	Skeptical Peer Review	X
	Search for disconfirming evidence	X
	Reflective journal	X

Perhaps the potentially biggest threat to “validity” in my study is what the Loflands (1995) call “insider bias,” the reverse side of insider understandings (generally considered a positive feature). In my study, the interviews—as member checks and

sources of alternative views—provide a powerful check against what Appadurai (2000) calls “private sources of confidence.” In the narrative, the dissenting opinion is foregrounded so that all voices are heard.

In addition, I had a “dissertation coach” who served as a skeptical peer reviewer throughout the final stages of analysis and the writing of the dissertation document. Per Devers (1999), he “played the role of devil’s advocate, asking difficult questions about methods, meanings, and interpretation of meaning.” From the rhetorical standpoint, he also served an essential function. His questions helped me craft my narrative and claims to allow the readers of my document engage in what Stake (2005) calls “naturalistic generalization.” Such generalization describes the way in which case studies allow readers to participate in the construction of their own knowledge about the phenomenon of interest (p. 240).

## Chapter 4

### Differences that Matter: Coding and Article Writing in the Two Groups

*When divergent groups work together, regulation is ongoing because people's different interests will exert disruptive influences on any agreement that the groups have reached. In order to see the ongoing regulation, however, researchers, need to look at how a document is used and supplemented over time (Winsor, 2007, p. 3).*

Nelda, undergrad: We coded our single interviews, or two people were coding it at one time, and then we put it up on the board and it was very interesting to see how close we were at some point and at some point how different we were and where our answers were different.

Glenda, graduate student: I didn't know what a transcript was, learned what coding meant. I thought coding was C++ programming. I learned that each line is important.

Delilah, doctoral student: Then we would talk about that's not what I mean by real world, is that what you mean by real world or relevance, and try to get a common understanding of what the words meant. That was the initial part of using the code just to make all the readers somewhat reliable and on the same page.

In this chapter I describe the activities of coding and article writing in which the two groups engaged. The purpose is to establish them as important sites for negotiation and group knowledge construction, and to make the material practices associated with these two signature research activities visible. This chapter presents the first in a series of linked analyses following Smart's (1998, 2006) interpretive ethnographic approach. This approach combines linguistic, theoretical, and observational investigations with textual analysis in order to bring together the local experience of participants with theoretical categories. Thus, the differences that matter were signaled by participants' use of particular terms or phrases, suggested by my observations and subsequent

analysis, or mentioned by participants during the interviews. Negotiation emerges from this analysis as a potential lens for bringing together the experience near and distant.

As explained in Chapter 2, viewing the development and use of a coding protocol as a genred activity can help illuminate the ways in which a code book can serve as a pedagogical and research tool, analytic framework, and “organizational memory.” In this context, the creation and use of documents, for example a coding protocol (“code book”) or a conference paper, embody social activities that permit novice and master practitioners to negotiate shared meaning and develop shared practice. The artifacts and material practices associated with their creation and use are part of the infrastructure that supports the intellectual collaboration of the groups.

I begin to address the first of my research questions and anticipate how they will be addressed in the following chapters, which provide more detailed analysis of the negotiation processes in the two groups.

My first set of research questions are:

**RQ1. What are the differences that matter between the two groups in the material practices associated with coding and article writing?**

**RQ2. What do the artifacts produced by the groups reveal about tensions related to learning to do qualitative data analysis?**

In the following sections, I first describe what a typical meeting looked like in the two groups, then provide an overview of the genre inventory for the groups. Next I look at the ways in which coding and article writing were enacted in each group based on an analysis of the artifact trail. Finally, I highlight two functional genres that emerged: regulatory documents and epistemic tools.

## **1. A Typical Meeting and Associated Documents**

Each of the research groups met weekly for approximately two hours per week for 11 weeks during the academic quarter. Before being given transcripts to work with, participants had to take Human Subjects/Instructional Review Board training online. This ramp up period allowed time to submit a Human Subjects Modification form so that participants could have access to the study data, i.e., the transcripts. Each group spent time during the first two weeks discussing individual and collective goals and expectations and personal biases. In Group 1, biases were discussed during the weekly meeting. In Group 2, participants wrote a short reflective piece on their biases as homework for the first week. During the second session of Group 2, the faculty lead conducted a strengths, weaknesses, opportunities, and threats (SWOT) exercise to surface possible sources of conflict in the group. This began a trend of decision making inclusive and visible to all. The agendas continued this trend by summarizing and forecasting issues, decisions, and key tasks.

Table 4-1 summarizes the major differences in the activities and work processes of the two groups related to coding. Differences were determined through an early comparison of my observation notes and the document archive for the two groups, as explained in Chapter 3. The primary source of data for Group 1 was the Technical Report prepared by the research scientists at the end of the quarter, which included most of the artifacts produced by the group (Turns et al., 2007).

The faculty lead took a divide and conquer strategy in Group 1—participants were assigned individual transcripts, which they continued with throughout the quarter. In Group 2, all participants initially coded the same transcripts. After acceptable inter-rater reliability was reached, transcripts were apportioned to the group, but each transcript was coded by at least two coders. As described by the participants, the process in the first group was more about brain storming and choosing rather than resolving conflicts.

**Table 4-1 Dimensions for Comparison in the Two SEED Groups**

<b>Dimension</b>	<b>Group 1, Spring 2007</b>	<b>Group 2, Autumn 2008</b>
<b>Goals of Analysis</b>	"Bubble up" ideas, sense of what in the dataset	"Crunch mode," produce results, write articles
<b>Group Dynamics</b>	Brainstorming based on divergence and convergence exercises, lots of individual choice, and a divide and conquer strategy for production	More collaborative based on group and paired negotiation exercises versus individual coding with group consultation
<b>Coding Methods</b>	<p>Object of analysis was interview/person. Attempt to create personas through pseudonyms and characters.</p> <p>Whole transcripts used; participants responsible for difference transcripts (divide and conquer)</p> <p>Grounded theory, divergence and convergence exercises</p> <p>No overarching theoretical lens</p>	<p>Object of analysis is motivation and difference. Unit of analysis is turn-taking events.</p> <p>Paper transcripts still used, but primary analytical tools are spreadsheets. Code book was developed through iterative process.</p> <p>Hybrid inductive/deductive analysis; reliability negotiations with all 10 coders on 4 transcripts; paired coding for other 27.</p> <p>Theoretical framework for motivation; difference emergent theory</p>

The following description from the student-led TC article<sup>1</sup> describes the process as consisting of “discussions.” In addition, this same language of discussion but not negotiation is used in the coding rules (see Artifact 4-1):

*The first exercise for all participants was to read through all of their assigned transcripts and return to the research group with observations on the interviews. The group then discussed the transcripts....Participants posted the resulting coding to a wiki (where almost all written correspondence was archived) and discussed the coding in subsequent sessions. The discussion continued through the course of the quarter, in addition to an interrater reliability exercise to ascertain the consistency of coding across all the participants in the research group (Larson et al., 2009).*

The following description of the methods used in the second SEED group was reported in the final report to the National Science Foundation. The coding approach matured significantly, as reflected in the tools used in the coding activities:

*To improve the quality of the filtering, all transcripts were coded by two coders from coding team of ten people. This team included the three authors as well as seven other students who were part of a program that provides course credit for engaging in authentic research. In this process, reliability had several purposes. It was used as an (2004) indicator of rigor (i.e., calculating inter-rater reliability using both percentage agreement—above 85%—and Cohen’s kappa as a way to monitor rigor). It was also used as an idea generation tool: disagreements were used as a basis for refining the coding scheme (Atman et al., 2004).*

This language of disagreements and reliability suggests that negotiations are important. In Group 2, the process of training and checking inter-rater reliability rested on a negotiation process, among the entire group initially and between pairs eventually. This process was inherited from the Center for Engineering Learning and Teaching (CELT) coding process, with which the faculty lead is associated, in which two coders

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<sup>1</sup> In this document, I refer to Larson et al. (2009) as the student-led TC article and Turns and Ramey (2006) as the faculty-led TC article, respectively.

code the same set of data, agreement is calculated, then they negotiate to consensus. If they can't reach consensus, the coding scheme is revised. The idea is that somewhere in the disagreement is a clue to what isn't working with the code. Thus, reliability checks can be a way of testing and iterating the rules and procedures for coding. This coding technique has been used in numerous research studies conducted by CELT. This approach also surfaced misconceptions and misunderstandings serving as a valuable training tool, as discussed in Chapter 5.

Group 1 did not produce a lot of artifacts and used documents primarily for information sharing rather than to coordinate the work of the group. The major exceptions to this were email messages and the weekly meeting agendas which were created solely by the faculty lead and other members of the management team, behind the scenes.<sup>2</sup> The student-led TC article points out the importance of those artifacts that were produced as measures of progress, and hints at their potential to facilitate knowledge construction. The following passage also highlights the tension between producing and learning in the first group:

*Because of the nature of this work, it was perhaps no surprise that students in our research group reported that it was sometimes difficult to feel like the group was progressing as we pored over transcripts, and they sometimes felt like we were "thrashing about" (a term used by a student in the research group to describe the process) when we discussed the data and argued about what the data were telling us. Interestingly, one way the students did seem to feel progress was being made was when there was an artifact produced (e.g. contributions on the wiki, rough drafts of papers). Such artifacts ultimately*

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<sup>2</sup> It was difficult for me to locate artifacts from Group 1 for the interviews that would stimulate recall effectively and also hold enough content to serve as boundary object for my discussion with the interviewees. Since I participated in the first group remotely via telephone, most of the artifacts I collected during the actual quarter the group met were embedded in email messages, making it hard to disaggregate them. In this study, I relied primarily on the Technical Report (Turns et al., 2007), which also removed boundaries from individual documents.

*served three purposes for the group: they provided structure for our discussions, they often gave us topics to debate, and they also helped cement understanding* (Larson et al., 2009, pp. 175-176).

On the contrary, Group 2 was extremely document rich as discussed in the genre inventory in Chapter 3 (see Table 3-2). The ongoing tension between production and learning goals is reflected in this inventory. For example, there is a division between those documents and activities designed to achieve production goals, i.e., get the transcripts coded, and those that were designed to promote learning by having students reflect on their experience, raise concerns or issues, and produce preliminary interpretation of the data. The agendas served both purposes; the biases, SWOT analysis, and take-aways were intended to support individual learning and also helped the group function more smoothly by heading off potential tensions.

There was not much discussion of types of texts that individuals posted to the GoPost (the university's electronic message board tool) as homework, although the faculty lead read and responded to particular points as appropriate. The genre inventory indicated that two types of documents and symbolic tools were particularly important: regulatory documents and epistemic tools. These two types of functional genres are described below. The role they played in negotiations in the two groups is discussed further in Chapter 5.

## **2. Regulatory Documents**

Agendas and code rules/books were the primary regulatory documents in both groups. Regulatory documents, according to Winsor (2007), embody rules and

agreements that groups develop in order to coordinate their activities. As Zachry (2007) explains, regulatory controls include both explicit rules and regulations and implicit controls such as norms and unofficial ways of doing things. The artifact trail can show how these norms and practices become regularized and adapted (Gygi and Zachry, 2010). The agendas were developed solely by the faculty lead. The code books were developed by the group through a series of discussions and negotiations. From the stance of rhetorical genre theory, how these documents and symbolic tools are developed and used is as significant as their form and content. Thus, the details of the code book development are given here.

Artifact 4-1 is the Agenda from Group 2 for Week 1. This first agenda served as a mini syllabus. Subsequent agendas became more complicated. They don't look like lists of normal agenda items; instead they capture important decisions and anticipate issues, dilemmas, and challenges for students. Turns and Ramey (2005, 2006) identify the lack of a syllabus as a major difference between a directed research group and a course. Both SEED research groups were highly directed learning experiences even if they weren't a course. Each meeting had a full and integrated set of activities designed to move the group forward on production tasks and to accommodate learning needs.

Code books served as both regulatory and epistemic tools, that is they set the rules and they also helped coders do their work tasks as explained below. As Dana, a doctoral student in Group 2 described the function of the code books in her interview:

Dana: The code book seemed to be the master or controlling document for what our going theory of motivation was as coders. And it was a guideline we used to code for whether or not motivation was present or not.

## Artifact 4-1. Agenda for Week 1 from Group 2

### TC496/596: What does it mean to keep the user in mind when designing? Autumn 2008

#### Overview and Session 1 Agenda

- Faculty Lead: Felicia  
211 Engineering Annex
- Graduate Assistant: Debbie  
301 Engineering Annex
- Research question: In this research group, we will be asking the question: *How do designers keep users in mind when designing?* Such a question is motivated by current interest in user-centered design approaches that clearly emphasize the benefits of keeping the user in mind. While much work in the area of user-centered design focuses on presenting and advocating for techniques that will help designers more effectively keep the user in mind, much less is known about how practicing designers currently go about keeping the user in mind.
- What we will be doing: As a participant in the research group, you will help us analyze already collected interview data in which engineering educators (i.e., instructional designers) report on teaching decisions (commitments to particular elements of a design). In particular, you will help us analyze how the educators take learners (their users) into account in these decisions.
- What you may learn: As a participant in this research group, you can expect to gain insights into: a) what it means for a designer to stay focused on a user (through the data analysis activities and conversations with other group participants) and b) how to rigorously analyze interview data (through the data analysis activities and conversations about how to do these analyses rigorously). You will also have a chance to reflect on teaching (generally and possibly your own).
- General timeline: Period 1: Our first 2-3 weeks will be devoted to background on the project (history of the project, our research questions, discussion of papers that motivated us and papers/presentations we have prepared), getting everyone HSD certified, and getting introduced to the dataset.  
Period 2: The subsequent weeks will be devoted to data analysis using a pre-determined coding approach, resulting in a small number of "rigorously" determined answers.
- Agenda for day 1: 1) Introductions: What brings you here, what you bring, what you hope to get  
2) "496/596": Brief discussion, What exactly is a 496/596 research group?  
3) The research question: Discussion, Brainstorming types of answers  
4) Initial data analysis exercises: Some coding and discussion  
5) History of the project
- Next steps: 1) Human subjects training (by Monday, 9:00 AM)  
2) Write-up (by Tuesday, noon, posted to the "GoPost")  
3) Read "We all take learners into account in our teaching decisions: Wait, do we?" (by Thursday for discussion)

The “code book” was not as solidified in the first group but served a similar function in both groups; it allowed people to get down to work. The coding approach evolved and changed significantly between the two iterations of the research group and was tested and refined throughout the quarter in Group 2. The differences described below were confirmed and elaborated during the interviews, as were the impacts/value of the development and use of artifacts associated with coding and article writing.

Code book development started only after a long immersion process in Group 1, and no single code book resulted. Instead, separate threads developed, e.g., the real world and focus of the decision (see Artifact 4-2). These were pretty much emergent, and real world caught someone’s fancy, so the group pursued it. The use of frequency counts was not prominent, with descriptive codes and themes being more prominent. There was a single inter-rater reliability check in Week 7. The measure for reliability was the percentage agreement across all coders on a simple yes-no coding task. Participants coded the same interview segment, one selected by the faculty lead from segments nominated by participants because it was difficult to code, and a discussion about agreements and disagreements followed.

An example “code book” was introduced to the group in Week 3. Two codes, Focus of the Decision and Real World, were taken up in the Week 5 meeting after some brainstorming on the GoPosts. These codes were discussed in the following weeks and revised after the reliability check in Week 7 (see Artifact 4-2, Code Book Rules for Group 1). Group 1 was similar to previous qualitative data analysis groups in the HCD&E department, which used a grounded theoretic approach to coding and analysis. In

## Artifact 4-2. Code Book Rules from Group 1 (Technical Report, Week 5, p. 43)

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(1) Motivation – the justification for the teacher, the student or mutually beneficial? (Who is impacted vs. who is benefited?) – Name changed based on discussion to “Focus of the decision”

- Student – one, >1
- Teacher – other teachers and TAs
- Mutually beneficial
- Neither
- Notes: to support second coding (to unpack the number of students)

(2) Notion of real world – how that impacts decision making. (The mention the real world, or they don't mention real world) What are we looking for in real world? Yes or No answers... if yes... elaborate.

- YL – Real world literally
- YI – Seems to embody some issue of students (real world implied)
- N – No implication of the real world or implication or students getting jobs.
- If Yes \_\_\_\_\_ (elaborate and explain)

Example in Coding workspace

Real world

Keith, Interactive: YI, \_\_\_\_\_ (participants' words) and Elaborate why

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### Week 7, After Reliability Check, Final Assignment

1. “Focus of the decision” Coding (FINISH)
  - Revisit and/or complete your coding based on the “reliability” conversation and modifications to the coding rules
    - i. Use the following five values: student-focused, teacher-focused, **\*mutually-focused\***, **\*nobody-focused\*** (this was added for completeness, although we couldn't think of an instance where it would be used), **\*n/a\***
    - ii. Mutually-focused is to be used only if the participant himself or herself **\*claims\*** that the final decision reflected a focus on his/her own needs (e.g., in the “asserting control” instance, asserting control over a discussion or class could definitely benefit the instructor, but this decision would be coded as student-focused since the teacher did not explicitly say that she/he was focusing on himself/herself when making the decision). If the decision has the potential to address her/her needs, but the participant does not state that themselves, then the decision should be coded student-focused.
2. “Real World” Coding (FINISH)
  - Revisit and/or complete your coding based on the “reliability” conversation and modifications to the coding rules
    - i. Use the following four values: Real World-Explicit, Real World-Implied, No, **\*n/a\***
    - ii. Code the decision as Real-World Implicit if there is a specifically identified word or phrase within the excerpt that unambiguously refers to the students future work life as an engineer (this could include references to ABET or other policy bodies, references to the “profession”, to “engineering”).
    - iii. If such a word or phrase exists, code the decision as Real World-Implied even if the link between the real world reference and the decision is ambiguous. Use the justification as a place to comment on the link.

Group 1, the training period was framed more as a learning experience, described in Technical Report as a set of exercises (reflecting the learning orientation of this group) and discussions to familiarize the group with the data followed by a selection of codes, and then deductive analysis using the codes.

In Group 2 there was an attempt to solidify this coding process to make it more stable, rigorous, and firmly grounded in theories of motivation. The coding for the topic of Difference, however, was based more on emergent theories embodied in the code book rules. At the beginning there was no outline of the coding approach, although the Session 1 Agenda states that a predetermined coding approach will be used. However, there was a general understanding that the analysis would follow the general approach used in earlier CELT work, i.e., a hybrid deductive/inductive approach consisting of three iterative steps: filtering, coding, and interpretation. The group iteratively created code books for difference and motivation. The code book for motivation, which went through four versions but was stable by Week 5, features prominently in the negotiations illustrated in Chapter 5. The difference code book was developed and used first then put aside in Week 6.

### **3. Epistemic Tools**

The primary epistemic documents (textual artifacts for coding activities) for both groups were the transcripts and the code books. In Group 2, the transformation of these documents to tools was quite striking. The transcripts had been converted into Excel

documents and a variety of spreadsheet tools and templates were used in the coding and reliability activities. These tools are symbolic tools not simply documents (Smart, 2006). Rather than using more conventional transcript formats, the second group worked with print outs of Excel spreadsheets (see Artifact 4-3, Transcript Excerpts). Prior to the start of the second SEED group, the faculty lead filtered the original set of 31 interview transcripts, which comprised over 1,000 pages of text, and reduced them to turn taking events (TTEs) relevant to the two decisions of interest. These TTEs, which corresponded to question and answers, were compiled in a master Excel spreadsheet.

The faculty lead and the research assistant for the group used the master transcripts spreadsheet to generate example segments and printouts for coding. These were the primary workspace for coders, who then copied their results to an Excel template uploaded it to the GoPost. The unit of analysis in this group was the TTE rather than the *larger decision*, which was the unit of analysis in the first group.

The inter-rater reliability check from the first group became a regularized practice in the second group. The faculty lead named this practice uberreliability, because it involved looking at results across 10+ coders, rather than the normal pairs of coders. The first uberreliability exercise was done live in the Week 3 meeting (see Artifact 4-4, Uberreliability photo). In subsequent weeks, the faculty lead used a variety of measures of agreement to promote rigor and to show the group that progress was being made. As discussed in Chapter 5, the reliability exercises served as a way of making learning visible and provided a numerical, symbolic tool that used the data to facilitate negotiations over meaning and agreement.

**Artifact 4-3. Transcript Excerpts Handout from Group 2**

Seq	Who	Detail	Learner centered (Y/N)
2045	SD105	SD105: That's something, office hours, I've made a decision on to have a liberal policy with office hours, which eats up a tremendous amount of time. But, you know, when you look at your evaluations -- and for me, they always have these things when they rank you against yourself and like what are the attributes of this person, and the things that come up are, you know, enthusiastic about my topic, and then the other thing that comes up is that I'm always willing to help them out. They always come up one, two, or three, always	
2047	SD105	SD105: So I have an open-door policy, but, boy, I tell you, it takes a lot of time. Because I say these are my office hours, but they never show up during my office hours. They show up at every other time.	
2049	SD105	SD105: And before you know it the day is over, and, you know, it's like yikes, I didn't get anything done today, you know, all those proposals and journal article reviews and all that kind of stuff, so there is -- sometimes you do feel like, you know, your kind of path towards fame and fortune is somewhat impeded by doing a decent job on teaching, you know. You could be one more paper a year or whatever, you know.	
2059	SD105	SD105: Yeah, I've had some good examples where, for example, during the junior year all of the students are taking the same sequence of classes, so there are 80 students in the same five classes, and I always tell them, I said, you know, I'm going to work with all the team that are teaching this quarter so that we don't all give you the midterm on the same day.	
2061	SD105	SD105: You know, because that's like -- that's a problem.	
2063	SD105	SD105: And they're like, okay, cool. And so I send an e-mail to all the professors saying, okay, I'm going to give my midterm on the Wednesday of the fifth week or the fourth week or whatever.	
2133	SD105	SD105: Well, there are, yeah, yeah Not that I'm aware of, yeah. I mean there's one thing that's kind of a popular concept in environmental sciences called adaptive management, which is try this. If it doesn't work, try that.	
2135	SD105	SD105: If that works, keep on doing that. Modify it this way, you know, kind of like, you know, be willing to abandon things that don't work	
2137	SD105	SD105: Is kind of the simplest way to think about adaptive management, so you just try different things, and I've done that to some extent in my teaching, you know, throw this out there and see if it works for me, that's good. If it doesn't work for me, then bail on it and go to -- you know, try a different approach.	

## 4. Uberreliability—a Tool for Seeing the Disagreements

**Vignette in Group 2:** Week 3. The faculty lead created a matrix on the white board of all the results by coders. These results were Yes/No answers to whether or not the example interview segment indicated that difference was being considered in some way. The group discussed those segments with the most variability in order to reconcile differences. The faculty lead called the exercise uberreliability. The group was told that agreement between 10 coders is a high bar for reliability. This challenge gave the group a common goal, something to strive for.

### Artifact 4-4. First Uberreliability Exercise in Group 2

Segment	1	2	3	4	5	6	7	8	Label	Segment	1	2	3	4	5	6	7	8	Date
8565	N	N	N	N	N	N	N	N	B	8565	N	N	N	N	N	N	N	N	
8567	N	N	N	N	N	N	N	N	B	8567	N	N	N	N	N	N	N	N	
8569	Y	N	N	N	N	N	N	N	B	8569	Y	N	N	N	N	N	N	N	
8569	N	N	N	N	N	N	N	N	B	8569	N	N	N	N	N	N	N	N	
8563	N	N	N	N	N	N	N	N	B	8563	N	N	N	N	N	N	N	N	
8565	Y	Y	Y	Y	Y	Y	Y	Y	B	8565	Y	Y	Y	Y	Y	Y	Y	Y	
8551	Y	Y	Y	Y	Y	Y	Y	Y	B	8551	Y	N	N	N	Y	Y	Y	Y	
8734	N	Y	N	Y	Y	Y	Y	Y	B	8734	N	Y	N	Y	Y	Y	Y	Y	
8751	N	N	N	N	N	N	N	N	B	8751	N	N	N	N	N	N	N	N	

**Vignette:** Weeks 4-7. The continuing reliability negotiations included lots of numbers, including correlations of agreement and spreadsheets produced rapidly by the faculty lead, the “magic” she kept alluding to. Uploading and downloading the Excel coding template—everyone took a turn adding their results—was almost like a contest. People were interested in who got it first, and how quickly the document turned over. Versioning was not really a problem, though it seems like it might have been. These exercises continued until the code book for motivation was stabilized in Week 7 as a way of refining the code book and training the coders. Although most people seemed to be comfortable with the results of the reliability negotiations, some people kept striving for better numbers. The focus on numbers remained a tension in the group, as discussed in the following chapter.

This tool proved to be significant in helping the group balance production and learning goals as discussed in the subsequent chapters. Although this focus on numbers appealed to some in the group and to others not at all, during the interviews everyone mentioned the first uberreliability exercise, though they didn’t always remember the details.

Also during the interviews, several people expressed frustration at how long it took to get the code book agreed upon, perhaps thinking that the faculty lead should have worked things out in advance. In reality three weeks is not a long time to get people trained and to develop a shared understanding of tools and methods but in the framework of a quarter, students (and faculty) are accustomed to moving along rapidly.

The authors from Group 1 of the student-led TC article adopted the term of one the participants and called what they perceived as a lack of direction as thrashing. The management team emphasized the importance of immersion in the data, suggesting that the process of diving in, being overwhelmed, disoriented, etc., was an essential part of learning to do qualitative data analysis. The participants in the second group did not get the same kind of data immersion experience, in terms of having to deal with whole transcripts with no real structure or template to use in understanding it. Instead, they were given an already filtered and structured data set consisting of TTES in an excel spreadsheet. The transcript had been transformed into a tool.

### **3. Article Writing**

In Group 1, the research scientists took the lead in producing a poster and a conference paper before the end of the quarter which named student members—all in the poster, only 3 of the 6 students in the American Society of Mechanical Engineers (ASME) paper. The single public instance of negotiation in Group 1 centered on who would be listed as authors; however, the discussion took only a small part of the weekly meeting during Week 9. Most of the negotiation took place in an email discussion among the management team, recorded in the Technical Report. The article writing activities in Group 1 were the most visible site for tensions between production and learning goals, according to the authors of the student-led TC article. Group 2 produced an outline of an abstract (see Artifact 4-5, Abstract photo) as the final exercise in the last group meeting.

Artifact 4-5: Article Abstract from Group 2



As a counterpoint to coding, my interviews specifically asked about article writing. I found that article writing did not play a major role in either group. The single point of negotiation in Group 1 around authorship is discussed in Chapter 5.

#### 4. Chapter Summary

My investigations revealed the development of a practice that is recognizable: a hybrid approach to coding data about the experience of individuals, in this case interview data. Looking beyond the department to one of its parent fields of

professional and technical communication which have borrowed methodologies from the humanities and social and experimental sciences, I found similar approaches to coding in the work of Geisler (2004) and others who trace their roots to content, discourse, and verbal protocol analysis and also work in engineering education contexts.

This approach has been developed for use by student workers. The key findings are:

1. The language of discussion was common in Group 1, whereas the language of agreement and disagreement was striking in Group 2, as captured in the phrase "getting on the same page."
2. The coding approach was more mature and artifact rich in Group 2 than in Group 1. The use of reliability exercises was a regularized practice in the second group.
3. Two types of artifacts and symbolic tools were prominent in the artifact trail: 1) regulatory documents, particularly agendas and code books, and 2) epistemic tools, e.g., code books, transcripts, templates, and correlations.

In Chapter 5, I discuss how these tools are used in key points of negotiation in coding and article writing and helped Group 2 successfully balance production and learning goals. Some further implications of these findings are discussed below.

**Temporal Element:** The timing of the work products is important to note because it gives some sense of how quickly the groups got on the same page. The code book was finalized much earlier in the second group, stable by Week 7 after four versions, as opposed to a set of two different binary codes in the first group in Week 7. In 10 weeks this is significant. The first group "coded," i.e., finished 15 transcripts. The second group got through all 31 transcripts and each interview was coded by two different coders. Both groups had the same amount of time and work force for the job. The first group was arguably more productive in conventional terms, since it generated

a conference poster and an article; the second group only generated an abstract outline on the white board. The management team of the second group did generate a conference paper proposal just after the end of the 11 weeks (but still in the same quarter) and two papers in the subsequent quarters

**Tensions revisited:** The genre analysis in this chapter reveals a number of potential tensions and conflicts in the group, but is not sufficient to account for the processes by which they were negotiated. The student-led TC Article and summaries from the Technical Report suggest that issues weren't really negotiated in the first group. However, in order to count as negotiation, I had to know more about what was at stake in the group's interactions. In order to characterize the groups as low and high negotiation, I needed to do a different kind of negotiation analysis, as discussed in Chapter 5.

## Chapter 5

### “Getting on the Same Page”: How Negotiations Were Enacted

*Data analysis is a practical activity—it is made up of practices, ways of doing things, ways of getting by and making do. Data analysis is also, however, a philosophically contentious activity (Geisler, 2004, p. xiii).*

Gail, graduate student: I think with respect to qualitative research it makes it [referring to coding process] more rigorous, you need to have something to document that it's systematic... this is our way to bring rigor to the table and document this and our methodology.

Delilah, doctoral student: The [first reliability] negotiation was an important thing to witness...really surprised how little agreement there was with that many people. I found it interesting could clearly see patterns of people who tended to agree with each other more...seeing things through similar filter. It would be really interesting to look at what is their experience...parallelism in their experience.

This chapter discusses dimensions related to group task performance processes (e.g., nature of the task, division of labor, mode of participation) that are revealed by the lens of negotiation. However, interpersonal dimensions (e.g., norms and roles) and individual experience (e.g., identity, sense of belonging or ownership) are foreshadowed here and explored further in Chapter 6. This chapter develops and applies my negotiation framework to address the following question:

**RQ 3: What does the lens of negotiation reveal about the types of task-related group processes that occurred in the two groups?**

There was only one instance of negotiation in the first group but a wide variety of negotiations in the second group. Based on the prevalence of negotiation, I characterize the first group as the low negotiation (LNG) and the second as the high negotiation group (HNG). This following narrative highlights three significant instances

of negotiations, the single point of negotiation in the LNG and two from the HNG group. The narrative includes a discussion of the tools and practices associated with each of these negotiations and lingering issues relating to how the negotiations were conducted. The findings and significance of the presence of negotiation in the groups are briefly summarized at the end of the chapter.

### **1. Typology of Negotiations: Operationalizing Negotiation**

The linguistic and genre analysis presented in Chapter 4 revealed that participants in the second research group used the term negotiation frequently and in a variety of ways, sometimes metaphorically and sometimes more literally. Negotiation is a group interaction in which members try to reach agreement about perceived differences in interests, concepts, or viewpoints, but they may not get there. For my purposes, negotiation means that participants work through their differences until they reach compromises that are acceptable to all.<sup>1</sup> These differences may be resolved through discussions and through the use of other discursive or communicative symbolic tools such as documents, correlations, and spreadsheets.

This definition applies to cooperative not competitive groups, in which members share common goals and the conflicts consist mainly of conceptual differences. This is not like labor bargaining, where the resolutions may be highly asymmetric in expected

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<sup>1</sup>Taken from collaborative practitioner research, Hinshaw, Chance & Atwood (1981).

gains depending on such factors as power and influence. In this context, gains can potentially be maximized for all through increased performance and group outcomes.<sup>2</sup>

According to McGrath (1983, 1991), negotiation is embedded in the type of task, e.g., occurring specifically in decision making or judgment tasks that involve having to reach a consensus when there are differing values, motives, or payoffs. Less obvious than conflicts in interest or motives, but prevalent in groups doing knowledge work, are cognitive conflicts, which involve disagreements about what McGrath calls the underlying judgment pattern or judgment policy.<sup>3</sup> In my study groups, the coding task itself entailed the tension/conflict between production and learning goals, but also between qualitative and quantitative methods. As introduced in Chapter 4, “quantizing” is a common approach in engineering education research (Borrego, Douglas, & Amelink, 2009; Chi, 1997); this approach raised issues for participants in my study groups that were unresolved, as revealed in the interviews.

Adopting negotiation, a local and theoretical category, as a conceptual lens, I developed a typology of negotiations to “code” my data following a general inductive approach to analysis that includes both categories derived from tested empirical frameworks and emergent themes in my data (Thomas, 2006). I first categorized the coding-related activities of the two groups according to McGrath’s (1983) four types of tasks: generate (plans and ideas), choose (correct or preferred alternatives), negotiate

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<sup>2</sup> Because these groups are interdependent, the value of individual contributions to group products depends on the contributions of other participants (Straus, 1999, p. 169).

<sup>3</sup> The relevant information cues, their weights, the functional form by which these cues connect to the criterion events, etc. (McGrath, 1983).

(conflicts of viewpoints and interests), and execute (action tasks)<sup>4</sup>. Next I created a matrix that identified the timing, actors, and what was at stake in these negotiations. Table 5-1 provides an overview of this analysis. This is not an exhaustive list of negotiations, but it captures the significant negotiations revealed by my analysis and what interview participants deemed significant.

All four types of tasks were present in the two groups, but their prominence differed as did their timing. For example in the first group, generating in the form of brainstorming and raising issues around coding continued throughout the quarter. When it came to developing codes, the group as a whole didn't have to agree, someone just had to choose. Since participants were coding their own transcripts, they did not have to agree on interpretations or specific applications of the coding protocol. Confirming the lack of negotiation in the linguistic and genre analysis, this group is characterized as a low negotiation group (LNG). As the genre analysis in Chapter 4 demonstrated, negotiation was more apparent in the language used by the second group and was embedded in the coding approach used. This group is characterized as the high negotiation group (HNG).

The primary mode of task performance relating to coding was "choosing" in the LNG, "negotiating" in the HNG. Both modes relate to decision making or problem solving tasks according to my typology. However, the typology assumes that negotiation tasks involve inherent conflicts in viewpoint or interest and making decisions in cases where there is no correct or preferred answer. Therefore, reaching consensus requires a high

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<sup>4</sup> McGrath's terminology changed between his 1983 and 1991 books. I follow Straus' (1999) version of McGrath's typology.

**Table 5-1. Points of Negotiation for Group 2, Autumn 2008 (excerpt)**

Week	Negotiation	Where See It (Data Source)	Who	Positions	Goals	Resolution
Wk1 9/25	Research Question/ Focus of the Research	Agenda, Discussion, Handout Exercise, Take-Aways (GoPost*)	Lead, Students	Educators vs designer	Get transcripts coded; facilitate learning; learn about teaching, design, research	Group agreed to reframe; Participants express willingness to suspend disbelief...go with the process;  Issues focused around uncertainty; separating data from inference
Wk2 10/2	RQ cont.	Agenda, Discussion, Handout Exercise, Biases (online); SWOT analysis				
Wk6 10/30	RQ cont.	Motivation vs. Difference				FL decides to go with motivation solely in Wk6
Wk 1	Roles/ Identity			Students vs teachers; students vs. researchers		Not addressed...continuing
Wk2- Wk11	Roles /Identity	Bias (GoPost); Final Take Aways				
Wk1- Wk11	Dissenting opinion: Methodology	First exercises; Final Take Aways		Problematize approach		Discussions about approach, inclusion...not resolved....continuing
Wk4 10/16	Reliability	Ex 0.5; First pass motivation-B/N10/22; GoPost on motivation results	Lead, participants	Liberals vs. conservatives	Code first transcripts; test coding scheme; train coders	Coding for Levels 1&2 only;  Still negotiating focus on difference and motivation; coders are a bit anxious, uncertain

\*GoPost=University's electronic messaging tool.

degree of coordination among group members who need to negotiate differences in values and goals as well as concepts.

In the first group, the LNG, participants were less interdependent in their coding because the activities during the quarter emphasized individual choice and the work load was apportioned using a divide and conquer strategy (faculty lead used this term in interview), i.e., individuals were assigned different transcripts. There was an extensive data immersion phase, which involved diverging and converging but did not require agreement. The role of negotiation was very different, and more prominent in the second group, hence the designation as the HNG. For example, the “uberreliability” activities in the HNG, in which all 12 coders coded the same interviews, were named and designed as negotiation activities, and participants talked about negotiation a lot. The actual negotiations about reliability involved working with numbers as well as text as described in Chapter 4.

As illustrated in the following section, the negotiation analysis showed that the group was constantly negotiating differences in viewpoint and potential conflicts of interest (e.g., personal and disciplinary understanding of research and theory, production vs. learning). Furthermore, negotiation was achieved in the HNG through data analysis and training exercises together with related discussions about agreements and disagreements among the people involved in the exercises.

The conflicts in concept might be reframed as simpler decision making tasks that resulted from lack of knowledge or clarity on the part of individual members.

Discussions and knowledge sharing make the answers clear...the learning by doing. My topology of negotiations began with McGrath's two subcategories of negotiation—conflicts of interest and viewpoint. Like others who have used this typology (Straus, 1999; Beersma & De Dreu, 2002; Hinshaw, Chance, & Atwood, 1981), I found that I needed a third conflict category, "concept conflict," in order to describe the types of epistemic conflicts that were negotiated in the 2 SEED groups. Furthermore, there was a different kind of negotiation that involved participants figuring out what their role was in the group, what the expectations were for participation on the part of the management team and the students, and how they positioned themselves vis a vis the group and the methodological decisions that were being made.

This type of negotiation is more akin to the type of negotiation that Flower (1994) and Wenger (1998) describe and properly belongs to the interpersonal as opposed to task dimensions that are negotiated in groups, according to McGrath (1983). Although it could be viewed as an outcome of other negotiations by the group, I added it as a fourth type of negotiation. This typology is illustrated in Table 5.2. These categories were used to classify the types of negotiations that were evident in the artifacts created by the two groups and through my observations. These same categories were evident in the individual participants experience of the group negotiations, and their internal negotiations that bubbled up in the interviews.

Analysis of my notes and artifacts led to a classification of key points of negotiation during the quarter for the HNG. The most active negotiations occurred during the first part of the quarter, in determining the focus of the analysis and research

questions and in the development and use of the coding protocol, e.g., code book development and reliability checks. The code book for motivation was stable by Week 5. After Week 5, the data was driving subsequent negotiations rather than differences in viewpoint or concept.

**Table 5-2. Negotiation Typology Based on Type of Conflict/Tension**

Type	Conflict	Example from Groups	How Resolved
Concept	Different conception of the task or its contents	GP2: Are educators designers? Week 1 (early)	Resolved through bias exercises, making differences visible, reframe UCD
Viewpoint	Different understanding of the rules for engagement (rule structures)	GP2: Liberal versus conservative stance on applying code book rules Week 5 (mid-end)	Resolved through rules; appeal to expert authority theory (but dissenting opinion)
Interest	Perceived conflicts in goals or expected gains	GP1: Authorship for conference paper Week 9 (late)	GP1: Resolved by consulting with guidelines, discussion of positions; faculty lead decides for more inclusion
		GP2: Focus on motivation versus difference Week 6 (mid)	GP2: Faculty lead chose; participants agreed; interviews indicate unresolved for some
Role	Conflicts in schema, institutional versus discourse roles	GP2: Being a peer versus a student; being a teacher versus a peer Week 1-11 (ongoing)	Outcome of other types of negotiation; shared participation and other inclusive practices

For the rest of the quarter the group focused primarily on executing, coding the entire set of 31 transcripts and writing interpretations<sup>5</sup> for each subject. Thus, the analysis of the last few weeks shows few negotiations. The faculty lead returned to learning during the last week, asking participants to reflect on what they learned and what the data showed by writing an “elevator speech.” Their reflections indicate that some conflicts lingered, for example disciplinary differences in what counts as evidence, but the group was able to move forward anyway.

## 2. Significant Points of Negotiation Illustrated

This section elaborates on the conflict types in Table 5-1 above, presenting three negotiations that were front and center in the study groups, that is, they involved the whole group and were consciously taken up by the group in discussions (live or online) or through reliability activities. These three negotiations exhibit the quality of awareness that Flower (1994) deems essential to negotiation. For each of these negotiations, the narrative : 1) provides a descriptive vignette; 2) categorizes the type of negotiation and provides evidence from my data; 3) discusses how artifacts/tools were used in the negotiations;<sup>6</sup> and 4) explains how the negotiation was resolved.

The first negotiation over article writing, involving a conflict in interest, was the only true negotiation in the LNG. The next two negotiations are key negotiations in the

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<sup>5</sup> These interpretations are like mini memos. Memos are commonly recommended as analytic tools in qualitative data analysis, see Lofland & Lofland (1995); Miles & Huberman (1984); Silverman (2001, 2005).

<sup>6</sup> The uberreliability (reliability for 10+ coders), exercises could be described as an embodied negotiation as well as a component of the coding approach viewed as a situated practice/genred activity. I chose to describe it in Chapter 4 as a essential tool and practice in the coding process.

HNG. I chose them because they illustrate two of the negotiation types, involving conflicts of concept and viewpoint respectively, occurred at different points in the quarter, and were resolved by different means, including discussions and the use of numerical symbolic tools. The fourth type of negotiation, role negotiation, was emergent and internal and was not fully revealed until the interviews, which was also true for other lingering conflicts/tensions as discussed below.

### **Negotiation 1 LNG: Authorship Guidelines (conference papers)**

The first negotiation over article writing, involving a conflict in interest, was the only true negotiation in the LNG according to my typology. It happened late in the quarter but is significant because in the student-led TC article, the participants described the tension about authorship and ownership as a significant tension in the group.

**Vignette:** Week 9. Rosalyn<sup>7</sup>, one of the two research scientists from the LNG management team, took the lead on preparing a paper for the ASME International Mechanical Engineering Congress and Exposition, a conference she planned to attend. During the Week 7 meeting, she asked if anyone wanted to be a co-author. Gail the undergraduate research assistant (who is a graduate student when she participated in the HNG) was tasked with drafting the research section. David, one of the doctoral students, volunteered his writing skills to help. Rosalyn emailed a draft to the group

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<sup>7</sup> Only the two doctoral students from the LNG group were interviewed as explained in Chapter 3, but all participants in the vignettes have pseudonyms. The first letter of the name corresponds to the level, e.g., R=research scientist.

after the Week 9 meeting. According to the email message, the undergraduate research associate wrote the results section from the coding results posted to the WIKI. The two research scientists also prepared a poster for the university-sponsored symposium on *scholarship of teaching and learning, a venue for research conducted primarily by graduate students and faculty on campus*. None of the group's weekly meeting time was actually taken up with writing these documents. Rather they were sent out to the group, primarily for review. Participants were invited to comment and edit, focusing on red flags. What did ensue was a discussion of who could be considered an author based on the authorship guidelines developed by the larger research group associated with the Center for the Advancement of Engineering Education (CAEE), which housed the SEED study.

**Type of Negotiation:** This was a true conflict of interest, though the participants may not have understood it as such. Initially, the authors only included the management team, i.e., the paid staff. None of the three doctoral students was listed initially. Review of the Technical Report reveals an email discussion among the professional staff about author order and inclusion. This was resolved by the management team, with two out of three doctoral students included on the final paper submission.

**Tool:** Author Guidelines, reliance on decision by authority, i.e., the faculty lead.

**Resolution:** The authorship guidelines ruled initially, but were negotiated in the weekly group discussion and by individuals through email exchanges with the management team. The faculty lead held the ultimate decision but was open to these arguments and she was not actually present during the Week 9 discussion with the

## **Artifact 5-1. Authorship Guidelines from Group 1 (excerpt)**

### CAEE Publications and Authorship Guidelines

Approved: February 20, 2006

#### I. Intent of the Publications and Authorship Guidelines

- a. To promote coordination and conversation (beginning early in the authoring process) about inclusion on writing teams, authorship order, and acknowledgments.
- b. To encourage transparency in the authoring process so that other team members are informed of what authors are planning to write about.
- c. To assure accurate interpretation across methods and institutions through collaborative dialog between authors and relevant participants.

#### II. Recommended CAEE process for creating and submitting articles/papers

- a. Follow the Academic Pathways Study Data Access Policy (for members of the APS team or those using APS data).
- b. Submit abstract to the CAEE Leadership team and campus PIs, [asking if others want to participate] inviting participation in creation of the paper.
- c. Share draft of the paper and invite comments.
- d. Include only legitimate authors as outlined below.
- e. Acknowledge persons providing input but who do not qualify as legitimate authors.
- f. Acknowledge NSF funding including specific mention of the NSF grant number.

#### III. Who is a legitimate author?

- a. All authors should have made substantial contribution to at least two of the four main components of a typical scientific project or paper \*
  - 1) Conception or design
  - 2) Data collection and processing
  - 3) Analysis and interpretation of the data
  - 4) Writing substantial sections of the paper (e.g. synthesizing findings in the literature review or the findings)
- b. All authors should have critically reviewed successive drafts of the paper and should approve the final version
- c. All authors should be able to defend the paper as a whole (although not necessarily all the technical details).
- d. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content.

*\*Suggested Authorship Guidelines.* Retrieved September 3, 2004 from <http://research.utmb.edu/starline/integrity/guidelines.htm>; British Sociological Association: Authorship Guidelines for Academic Papers. Retrieved September, 3, 2004 from [http://www.britisoc.org/uk/s/word/guidelines/authorship\\_01.doc](http://www.britisoc.org/uk/s/word/guidelines/authorship_01.doc)

## **Artifact 5-2. Email Authorship Discussion Excerpts**

**Email sent to group on 4/19 (Week 4), from Technical Report, p. 258**

Dear gang,

I'm attaching a draft of a poster about the SEED rsch that we are planning to present at 3 venues:

1. UW Scholarship on Teaching and Learning (SoTL) 2-5pm, Tues 4/24, HUB west ballroom
2. American Society for Engineering Education - Pacific NW conference (ASEE-PNW), Friday 4/27, Washington State University
3. STC chapter mtg, 6pm , Tues 5/22, UW Walker Ames room in Kane Hall

We have added all of your names to the poster as members of the research team... so we want to get your okay and fb before we officially print it out for the gig next Tuesday. We are also hoping that some of you might be available to \*please\* volunteer to help present the poster at the 2 local venues on 4/24 and 5/22.

I'll print out a couple of hardcopies for class.

See you soon,  
-roberta

**Email sent to management team members during Week 9, from TR, pp. 68-69**

...The discussion about the authorship guideline was done in the last 15 mins or so...(correct me if I am wrong, Roslyn). In the discussion, we didn't discuss the authorship order but rather for names being included.

At the beginning of the session, Daren and Darlene both made a case about having Daren in the authorship, which we did follow up at the end of the session to hear their cases. We also asked other people who felt they should be included in the authorship provided that they can make a case for themselves (using the authorship guideline). Some people mentioned if the authorship guideline was provided in the beginning of the research group and that might alter the way they wanted to participate in the research group. But we have talked about these milestones over and over again in the session (and especially asked last week about who wanted to contribute in writing and who wanted to be added as authors, nobody really showed much interest besides Gail). It will be good if we can debrief about this discussion, I don't want some people to feel left out, but then last night, no one but Daren made a specific case about being added.

Anyhow... I am almost done with some implications/tips -- I will send it out in the next 15 mins or so.

thanks,

-randi

group. Although the interviews did not reveal any lingering issues surrounding authorship, the student-led TC article (Larson et al., 2009) identified the focus on article writing as the source of two key tensions: the emphasis on producing versus learning, and issues of ownership.

### **Negotiation 2 HNG: Reframing educators as designers (focus of the research)**

Concept was not a category in McGrath's (1983) original typology but this type of conflict was particularly salient in the HNG during the training period when the code book rules were being refined. Although the reframe in the focus of the research from designers to educators described in the following vignette could be explained as a shift in viewpoint, it did not obviously involve a set of rules that were potentially in conflict. Instead, it better represents the type of cognitive conflict that educators and others view as attaching to prior goals and expectations, e.g., schema that participants bring to the group (Turns & Ramey, 2005).

**Vignette:** Week 1. There was a large group, 16 people (12 participants plus four visitors) at the first session. The small conference room was crowded and chairs were in short supply. The session began with introductions and people talking about what they hoped to get from the group. Gail, Rosalyn, and Debbie, participants in the first SEED research group, were enthusiastic about bringing fresh eyes to the data. Gail and Debbie were part of the management team for this second group, together with the faculty lead and Frank, the visiting faculty member. The recruitment notice, which was emailed

around campus, the listing on the departmental web site, and the Agenda for Week 1 (see Artifact 4-1 in previous chapter) indicated that the focus of the group would be on “How designers keep users in mind.” Although some participants knew in advance that the data to be analyzed consisted of interviews with educators, not designers, and that the published focus was somewhat of a reframe, others only found out at the first meeting. People, hadn’t read the announcement closely, which stated that the interviews to be analyzed were with “educators (i.e., instructional designers).” Thus, the first meetings had to get buy in from the group.

Felicia, the faculty lead (self described) introduced the group to a novel user centered design (UCD) situation in which educators are viewed as designers, and user centered entailed being. Immediately after introductions during the same session, participants coded interview segments for whether or not the educator was learner centered (see Transcript Excerpt Handout, Artifact 4-3). They then discussed their results in small groups as a first step to coming to agreement, with a summary for the group. The “homework” assignment was to post takeaways and an interpretation of whether or not the educator was learner centered, based on the segments coded, and explain why.

**Type of Negotiation:** This was a potential interest conflict. For example, participants who were interested in designers and not teachers could have been disgruntled. However, the faculty lead reframed it as a concept conflict. In the first session the focus of the research group moved from designers and users to educators and learners, and the working research question also was reframed.

This negotiation took place mainly through discussions during the first meeting, when the faculty lead invited participants (for the first but not last time) to suspend their disbelief and to be open minded about what user centered design might mean. As discussed before, the agenda was used to frame the negotiation (see Artifact 4-1, Agenda). The faculty lead did not challenge participants' goals or intents in participating. Her negotiation with the group involved inviting them to reconceptualize the focus of the research by viewing educators as designers and teaching as a UCD activity.

The research questions continued to be refined over the quarter as the analysis proceeded, as follows:

- Wk0-1 Agenda Wk 1: What does it mean to keep the user in mind when designing?
- Wk1 Discussion RQ: How do designers keep users in mind?
- Wk 5 Handout: How did a group of educators keep the learner in mind when making teaching decisions?
- Wk 10 Abstract: How do engineering educators take motivation into account?

There was an additional work around that had to do with the actual phenomenon of interest. This was driven by members of the management team's interests in a particular topic: student motivation, individual differences in students, or personal pedagogical theories. These topics related to factors that engineering educators take into account when making teaching decisions. This potential conflict of interest about topic and focus was not negotiated by the group when eventually the difference coding ended in Week 6, as discussed in the final section of this chapter. The focus on personal theories was dropped when Rosalyn could not continue participating because of work conflicts.

This refinement and refocusing is not unusual for qualitative analysis; however, it is notable in this instance because the negotiation aspects of this reframe involved students in the “research design” in a non trivial way, potentially contributing to a sense of ownership.

**Tools:** Activities were the primary tools mediating this negotiation. In Week 1, the ice breaker introductions during the session and homework assignments on take-aways and biases, together with the strength, weakness, opportunity, and threat (SWOT) analysis during the Week 2 session, permitted everyone to put their cards on the table, surfacing any potential conflicts that might be anticipated early on in the session (see SWOT Table, Artifact 5-3.). These exercises were partially a response to issues raised in the student-led TC article (Larson, et al., 2009) about the first SEED group, when competing expectations were not publically acknowledged or negotiated. The SWOT analysis, done live on the white board, had the potential to become an ongoing embodied practice but was not revisited, unlike the “uberreliability” activities that continued throughout the quarter.

**Resolution:** The GoPost homework for the first week provides evidence that this approach worked initially (see see Artifact 5-4). The Week 2 SWOT analysis and midterm checkpoints about issues and challenges did not reveal any major unresolved conflicts (except that size was included in all categories, as a strength, weakness, opportunity, and threat, perhaps reflecting the crowded nature of the first meeting; I probed for this in interviews). The students’ final reflections on the Go Post at the end of the quarter (see Table 5-2) confirm and emphasize that finding. In the interviews with me, the

**Artifact 5-3 SWOT Analysis, Week 2 (From Observation Notes, White Board Brainstorm, no photo available)**

Being User-Centered → Being Learner-Centered

3 things that can be part of Learner Centered

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<p>Motivation RULES assumptions)</p> <ul style="list-style-type: none"> <li>- theory</li> <li>- inductive</li> </ul>	<p>Difference RULES</p> <ul style="list-style-type: none"> <li>-theory</li> <li>- inductive</li> </ul>	<p>Theory RULES (make</p> <ul style="list-style-type: none"> <li>- theory</li> <li>- inductive</li> </ul>
<p>1. find instances filter unit of analysis</p>	<p>2. Making sense</p> <p>Deductive As seen thru lens of theory Inductive</p>	

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> <li>- real</li> <li>- Excitement, enthusiasm</li> <li>- Size</li> <li>- Willingness to write</li> <li>- Ability to link to the data</li> <li>- Willingness to be honest</li> <li>- Ability to reach consensus</li> </ul>	<ul style="list-style-type: none"> <li>- Size ...dataset</li> <li>- Risk of over inferring</li> <li>- Level of expertise and potential for dominance</li> <li>- Learner-centered is BIG</li> </ul>	<ul style="list-style-type: none"> <li>- See teaching</li> <li>- New perspectives</li> <li>- Size</li> </ul>	<ul style="list-style-type: none"> <li>- Up to speed</li> <li>- Big expectations</li> <li>- Real</li> <li>- Size</li> <li>- We are in the system</li> <li>- LCD BIG</li> <li>- Risk of inference</li> <li>- Unit of analysis (person, decision)</li> </ul>

## **Artifact 5-4. Student Take-aways from Week 1**

(First letter of pseudonyms reflect participant's level; N=Undergrad, G=Grad, D=Doctoral, F=Faculty)

**Data: From Student Postings after Session 1**

**Is the participant learner centered (Wk 1 GoPost\*results)?** \*UW online discussion board

"After discussing with my group, we all actually came to an agreement about whether or not the participant was learner centered. We decided that the participant made an attempt at being learner centered but did not completely fulfill it." (Gail)

"In our group we only discussed SD105. Rather than reach a conclusion on whether or not this participant is learner-centered, we thoroughly discussed what it means for a participant to be "learner centered" as opposed to, say, "student centered."" (Nathan)

**Take-aways from first session (Wk 1 GoPosts):**

"The main thing I took away from our first section was that we have a lot of people. I know this isn't an amazing observation. But I know that with more people, the larger the scope and the more difficult it is to agree on specific issues. Everyone has a different idea of what the term learner centered means and everyone will bring what they think to the course. I think it may take everyone some time to agree on things, but when we all do, the term learner centered will be accepted by a larger audience than just our own." (Nathan)

"Even the excerpts we read during our first meeting showed that there will be much debate among the group about the intentions of the interviewee. There were some key areas where I felt the interviewee was "learner-centered" and my groups members disagreed and vice versa. I am sure that there will much more debate to come, which I feel will strengthen the research analysis." (Nelda)

"It's evident from the first session that we all have different conceptual ideas of what is learner or user centered design, and the group members range from shy to verbose. I came into the first session with a specific idea of what learner centered is, and my scope of the subject expanded and clarified by noon. Of course, there could be a possible downside to group diversity, which is a bunch of people who think that they are the "most correct", but we'll burn that bridge when we come to it." (Greg)

"I am intrigued by the wide range of motives that bring individuals to this research group in particular and research in general, evidenced by the introductions. I am looking forward to the process of negotiating criteria for what constitutes "learner centered."" (Me)

"The title of the research group "What does it mean to keep the user in mind when designing" implies that we are going to be considering some of the basic tenets of user-centered design. However, since the focus is on instructors and the design of curriculum the title could have also been "What does it mean to keep the learner in mind when designing AND teaching curriculum". While I have no problem with the original title – when considering students and instructors rather than users and designers I found it helpful to find a clear way to tie the two relationships together.

For me, TC theory provides a lens by which I can tie the learner and the user together. TC theory suggests that writers always have a vision of the reader in their minds while writing...The analogy to user centered design is that the user that the designer has in mind is a "mock user (s)" – and the same analogy works for learner centered design where the learner the instructor has in mind when creating curriculum is a "mock learner(s)". (Delilah)

"Also, another interesting aspect is to learn how one can keep the user in mind while designing the whole product. There are several processes a product has to go through to reach the final stage and so how should the designer stay focused on the user of the product during all the processes. Being a web-designer, I at times find it very difficult to stay focused on the user and end up focusing more on what's *prettier and modern as opposed to what will be more usable and convenient. I think the amount of material we have discussed and we will learn about educators isn't only applicable to learning styles but also to any other type of career since it helps us to stay focused on the users and follow the active and useful style of conveying information.*" (Glenda)

"It is challenging to someone with my disciplinary background to take decontextualized transcribed speech at "face value," so to speak, and to be able to subscribe meaning to the passages. In fact, all of what we know about how the meaning of language is socially situated resists such an approach. However, there are well established methodologies for coding interview transcripts that engage a different disciplinary conversation and that benefit the stakeholders for this particular kind of research. I am looking forward to learning how to do this kind of qualitative research." (Dana)

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**Table 5-3. Summary of Student Final Reflections**

Level	What Learned	Relevance for Careers	Concluding Remark
<b>Undergrad</b>			
<b>Nelda</b>	New ways to approach results that gave meaningful data what teachers do with student feedback	I believe everyone has a different personality and psychology and it is very very difficult to analyze what someone might be thinking just by reading the transcripts of their interviews. At times, I also felt guilty of distinguishing between professors and rating them whether they were concerned about students or not	Overall, I loved being part of a real research where I had the chance to analyze real data
<b>Nathan</b>	"User centered" could literally mean a million different things, challenging for field of TC	How to motivate users to be interested in my materials	The TC field gives everyone a chance to define what they think is important. I really don't think that there are any wrong answers. I guess that's why I like TC so much.
<b>Nora</b>	Learned what it's like to be in a research group, how to keep the user in mind	N/A	Overall, even though there was a lot of research and coding to go through, which may have taken a lot of time, it was worth it. I learned a lot about what it is like to be in a research group and it is kind of cool to know that I had some part in the study.
<b>Naomi</b>	What's being done in the real world not just potential tools	Experience will be valuable as I enter the workforce	Although "motivation" can be quite tricky to pinpoint because it can be unclear as to whether the educator is trying to motivate the students or is motivated by some other factor. The ambiguity with this research topic lent itself to great discussions that I really enjoyed.
<b>Master's</b>			
<b>Gail</b>	I can see the educator as a designer and designing (in relation to an educator) as the act of making specific teaching decisions	Led me to reflect on own teaching practice, concepts like decision-making motivation etc	But as a reader having read these transcripts for probably fifth time, I still find new meaning because of what I got to the transcript looking for. Yes, there are times when I feel like I know the transcripts inside and out, but I still find really "cool" data!
<b>Glenda</b>	What a transcript is and how to use it, important to interview the designer and interpret the transcripts in as many ways as possible	New understanding of usability trials, interpreting data in different ways and have multiple analysts	Basically, this course has broadened my ideological perspective in terms of the process of usability.
<b>Greg</b>	Expansion of the concept and reach of usability, deeper understanding of ways of motivating students and appreciation for instructors, new type of group dynamic	N/A	Our group seemed to be a little hectic at times, but I enjoyed working through definitions of motivation together and seeing the coding book come together. Not everything went smoothly all the times, but a certain level of confusion and apprehension should be expected in a directed research group.
<b>PhD</b>			
<b>Delilah</b>	A new perspective on engineering instructors (teaching) and a new appreciation of difficulties encountered when coding from transcripts (research)	reflecting on my own teaching decisions as I read the transcripts, and questioning how I motivated my students or considered their differences	This experience made me realize how important and difficult it is to define what to code for.
<b>Dana</b>	How to do something meaningful with interview data, unanswered questions about reliability and negotiation with multiple users	New understanding of ways of methods of analyzing interview data	For the sake of the hard work that I, and the rest of the group, have invested in this work, I hope that the principle investigators of this study will go on in their analysis to find meaningful and publishable conclusions. Many thanks.
<b>Debbie</b>	How to create a code book and how to do reliability	Model for how to do collaborative coding, continue with own student research groups	It was a nice "ground truthing" exercise—using theory as a lens, then using what was actually in the data to refine the coding scheme.

students who identified themselves as future usability specialists/designers (two undergrads and one grad) as opposed to the academic researchers (everyone else interviewed) indicated that they had been surprised by this change in focus but still found they were able to achieve their goals. They framed their learning and take ways as related to usability and not research per se. This is discussed further in Chapter 6.

### **Negotiation 3: Liberals vs. Conservatives (motivation code book rules)**

This negotiation involves conflicts in interpretation regarding the rules of evidence, which corresponds to McGrath's definition of a negotiation. Unlike the prior conflict in concept, which seems to have been resolved early and successfully, conflicts in view point may be harder to resolve. The conflict in viewpoint represented by the "liberals versus conservatives" positions in the code book rule negotiations described in the following vignette, together with the lingering methodological questions raised by Dana, indicated that disciplinary issues might be at play in addition to individual characteristics. What these potential sources of conflict meant for individuals is discussed further in the next chapter.

**Vignette:** Weeks 4-5. The group is reduced in size since the first week's meeting, though still large with 11 people in the room and Frank on the telephone. Having successfully negotiated difference rules the previous week, the group launched into motivation using Frank's first draft of a code book for motivation, a coding sheet, and two transcripts. The Wikipedia definitions discussed during Week 3 were included in the

code book, but the group fell back on the top three theories prominent in engineering education research, which also were summarized in the code book. Felicia, the faculty lead, proposed a working definition of motivation and explained that the code book rules provided ways to see motivation in the data, because the actual use of the word motivate was rare (because the interviews did not ask about motivation explicitly).

After some trial coding, there was a discussion about application and other issues. Dana raised the issue of what constitutes an interpretive versus a coding move. The assignment was to code two whole transcripts using the motivation code book, which had three levels of codes relating to motivation: relevance, nature, and action. Participants were given printouts of the transcripts because privacy concerns precluded emailing them. Frank agreed to make slight modifications to the code book.

Once the templates and revised code book were available on the Go Post, Nathan, an undergraduate, got to work immediately so he could finish his “homework” and enjoy Sunday afternoon football. Other coders were having a hard time with some of the rules, with a lot of maybes. Gail, a long timer on the SEED project who was experienced with this kind of analysis, commented:

*GoPost 10/20, Week 4: So I found this coding to be difficult at times. The times I struggled was when I was getting further away from the data. However, when I was staying very close to the data a lot of possible turn taking events would not have been coded. Because of this issue, I have a few "maybe." I know the maybes are more difficult to reconcile, but these are the areas I would like to discuss on Thursday. I was striving to stay close to the data and have explanations for all my decisions.*

Felicia introduced the notion of liberals vs. conservatives in her email reporting on the first motivation reliability check (see Artifact 5-6). Some participants took a

stance as being conservative, although the group agreed to take an inclusive approach at least initially on the four trial transcripts that were coded by all 12 participants.

During the group meeting the following week, Dana suggested that they were starting to see motivation everywhere. The coders pushed for a new coding scheme that would allow them to say maybe, even the “when in doubt rule” was not sufficient for everyone. Despite some lingering issues regarding this approach, everyone seemed relieved when the magic happened and the management team gave the go ahead to code the rest of the transcripts using Version 4 of the code book (see Artifact 5-8).

**Type of Negotiation:** Conflict in viewpoint. The process of developing a code book for motivation was an intellectual challenge. There was some guidance from theory but it was difficult to see in the data. The SEED interviews had not explicitly asked the educators about how they took motivation into account. Thus, figuring out how to see these dimensions in the data was an immediate challenge. Beginning with their own interpretations about whether particular segments involved motivation, the participants went on to develop rules and negotiate toward a shared view of how to identify and label these occurrences. The “Maybe” rule helped serve as a placeholder.

Artifact 5-5 summarizes the GoPost exchange over the first motivation coding exercises with whole transcripts. Artifact 5-6 presents the first reliability results for motivation, focusing on the binary decision, Y/N, whether motivation was present or not in the transcript segment (TTE). These results were posted to the GoPost just before the Week 5 meeting and included the total number of times each coder “said yes” and correlations between coders. This email message introduced the notion that some

## Artifact 5-5. Week 4 Motivation Postings to GoPost

### TC 496/596-SEED-Autumn 2008

Code Book and Sheet for Motivation Posted Oct 16, 2008 3:37



PM

Attached are the Motivation code book and coding sheet. Only code for Relevant and Nature (Codes 1 and 2) We will revisit the Action coding after this first pass. When you are finished coding, rename the file with your initials at the beginning and upload it back here.

Please spot check that the line numbers on the coding sheet match the transcripts.


Have fun!

#### Attachments:

-  Codebook\_for\_motivation-Version1.doc51K
-  Motivation Coding Sheet-Nathan-Bea.xls27K Posted Oct 19, 2008 11:46 PM  
here ya go...  
hope it looks good.

Nathan

#### Attachments:


-  CW Motivation\_Coding\_Sheet-Nathan-Bea.xls31K  
Posted Oct 20, 2008 9:38 PM

So I found this coding to be difficult at times. The times I struggled was when I was getting further away from the data. However, when I was staying very close to the data a lot of possible turn taking events would not have been coded. Because of this issue, I have a few

"maybe." I know the maybes are more difficult to reconcile, but these are the areas I would like to discuss on Thursday. I was striving to stay close to the data and have explanations for all my decisions.

Gail


#### Attachments:


-  Motivation\_Coding\_Sheet-Nathan-Bea-BAS10-20-08.xls34K  
05e38289c40d9e Posted Oct 20, 2008 10:17 PM

AH! I finally finished!

NORA 

#### Attachments:

-  RK Motivation\_Coding\_Sheet-Nathan-Bea(1).xls31K  
Posted Oct 20, 2008 11:00 PM

I thought we were asked to evaluate Nathan only but seems like everyone's doing Bea's coding too. In that case, I will have to wait to finish the second set tomorrow. . This does take a good amount of time.

--Nelda

Posted Oct 21, 2008 8:20 AM

Here is the first pass. It should be an interesting discussion because I am quite tentative on a few of them.

Delilah

## Artifact 5-6 First Reliability Results for Motivation (at end of GoPost above)

From Faculty Lead

Posted Oct 22, 2008 11:25 PM

Hi all - The results are in (focusing specifically on the binary motivation yes/no decisions). The good news--we did have some agreement. The reality news--we definitely have some work to do in order to achieve acceptable reliability.

The overall results are summarized below. The attached spreadsheets are compilations of everyone's individual coding and also correlations between pairs of coders. Some observations:

1. It is interesting to look at everyone's total count (number of times you indicated yes). Some people are much more conservative (e.g., P7-8, P9-6 and P3-8 for Bea) and others were more liberal (e.g., PX-31 and PY-28 for Bea). This might be a clue to moving toward reliability.

2. What's interesting in the correlations is that the undergraduates are highly correlated with each other, P7 and P1 [the engineering educators] are somewhat correlated with each other and the graduate students seem to be relatively correlated with the undergraduates and [the educators], with the exception of P9. My guess is that this is probably related to P9's conservative approach to coding.

3. Finally, I've highlighted a few sequences of turn-taking events that might be good places to start our conversations. These sequences include a variety of the coding results (e.g., places where many people said yes and also places where few people said yes).


Nathan: 37.5% perfect agreement

# said yes    count


	count
	49
1	22
2	6
3	8
4	14
5	8
6	7
7	7
8	8
9	5
10	2

4	8
5	4
6	2
7	2
8	3
9	2
10	3

### Attachments:

 • Nathan-Combined Coding  
Data-22Oct.xls413K

[Download](#)

 • Bea-Combined Coding  
Data-Oct22.xls278K

[Download](#)

Bea: 61% perfect agreement

# said yes    count

	51
1	4
2	8
3	2

**Artifact 5-7. Correlation Results for Final 15**

Results															
	Coder 1	Done?	Y-1	Coder 2	Done?	Y-2	Total sum	Yes-OR	%	Yes-AND	%	Agree	Disagree	Reliability	Kappa
SD108	Delilah	y	6	Gail	y	5	128	8	0.06	3	0.02	123	5	0.96	0.92
SD118	Nina	y	14	Naomi	y	19	158	21	0.13	12	0.08	149	9	0.94	0.89
SD116	Nelda	y	11	Glenda	y	4	109	12	0.11	3	0.03	100	9	0.92	0.83
SDPY101	Dana	y	10	Gail	y	10	109	14	0.13	6	0.06	100	8	0.92	0.83
SD115	Delilah	y	26	Gail	y	32	170	37	0.22	21	0.12	154	16	0.91	0.81
SD109	Frank	y	19	George	y	21	133	27	0.20	13	0.10	119	14	0.89	0.79
SD128	Nelda	y	9	Nina	y	17	145	22	0.15	4	0.03	127	18	0.88	0.75
SD112	Nathan	y	26	Naomi	y	39	226	48	0.21	17	0.08	195	31	0.86	0.73
SD129	Dana	y	12	Frank	y	26	98	26	0.27	12	0.12	84	14	0.86	0.71
SD124	Nathan	y	20	Naomi	y	27	105	31	0.30	16	0.15	90	15	0.86	0.71
SD121	Glenda	y	5	George	y	21	140	23	0.16	3	0.02	120	20	0.86	0.71
SD117	Delilah	y	11	Frank	y	31	208	36	0.17	6	0.03	178	30	0.86	0.71
SD104	Nathan	y	17	Dana	y	7	97	19	0.20	5	0.05	83	14	0.86	0.71
SD132	Nelda	y	10	Nina	y	20	107	25	0.23	5	0.05	87	20	0.81	0.63
SD107	Glenda	y	16	George	y	26	127	35	0.28	7	0.06	99	28	0.78	0.56
													251		

## Artifact 5-8. Code Book Rules for Motivation in HNG

### Coding Rules Version 1

#### **Code 1: Relevant to motivation**

Instructions: In each cell, record “yes” or “no” based on the following conditions.

Record Yes if

1. The turn-taking event explicitly uses the term “motivation” or a derivative of this term (e.g., motivating, motivate).
2. There is a place in the turn-taking event where you could replace an existing word or phrase with the term motivation (or one of its derivatives).
3. The turn-taking event has something to do with the desire or will or want that an actor has for engaging in a particular action.

Otherwise record “No”

Additional considerations

1. Continuation rule: Where possible, code turn-taking events independently. In other words, if a turn-taking event represents the continuation of a previously started idea but doesn't really contain the motivation issue, then code no.
2. When in doubt rule: When in doubt, code “yes”. This will allow more information to pass this filtering level and more into later coding and “interpretation” activities.

#### **Code 2: Nature of Relevance to Motivation**

Instructions: For each turn-taking event that was labeled as “Relevant to Motivation”, use one or more of the following codes to note the nature of the relevance of the passage to the general issue of motivation

- Interest: The passage involves the educator expressing interest in motivating students
- Theory: The passage involves the educator articulating a theory (set of ideas) about what motivates student
- Action: The passage involves the educator describing an action which is relevant to the issue of motivating students (either because it was chosen in order to affect motivation, or it is known to affect motivation)
- Other: Use this code to capture types of relevance that do not seem well described by one of the previous categories. When using this code, you should also add a “tag” suggesting the “nature of the relevance” as you see it.

#### **Code 3: Motivation Actions**

Instructions: For each turn-taking event that received an “Action” value for the “Nature of Relevance” code, use one or more of the following values to note the type of action that was taken. These types of actions are based on various theories of motivation.

- Choice: The passage involves the educator giving students freedom, flexibility or choice, or alternatively involves the educator constraining flexibility.
- Relevance: The passage involves the educator taking action to make the course content relevant, such as by introducing of real-world examples.
- Challenge: The passage involves the educator setting the difficulty or challenge level of course work (tests, assignments).
- Relations: The passage involves the educator striving to build positive relations with students or promote positive student-student relations.
- Goal Orientation: The passage involves the educator using extrinsic goals (e.g. grades or other rewards/punishments) or intrinsic goals (e.g. feelings of competence).

- Other: The action take by the educator does not fit into any of the above categories.

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<b>Coding Rules Version 4, Final</b>
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**Code 1: Relevant to motivation**

Instructions: In each cell, record “y” if *any* of the below are true, otherwise record “n.” In addition, if decide the turntaking event is “y” for motivation, then use the subsequent columns on your spreadsheet to record WHICH of the following rules you used to make your judgment (follow instructions in the worksheet).

1. The turn-taking event explicitly uses the term “motivation” or a derivative of this term (e.g., motivating, motivate) related to *students*. Alternatively, the event uses a term (encourage, push, etc.) which can be substituted for “motivate”.
2. The turn-taking event includes any of the following key words or ideas in ways that suggest the faculty may be trying to motivate students (note the “or similar terms” aspect of each):
  - a. relevance, real world, authentic, related or similar terms
  - b. choice, freedom, autonomy, control or similar terms
  - c. difficulty, easiness, mastery, competence, challenge or similar terms
  - d. fun, excitement, interest, enthusiasm or similar terms
  - e. Incentives, rewards, punishments, rules or similar terms
  - f. Goal, objective, drive, desire, want, incentive or similar terms
  - g. Responding, listening, relating, connecting or interacting with students
3. When in doubt: While not fitting into any of the above category, the turn-taking event still seems to have something to do the faculty member wanting to influence a student’s desire to engage in a particular action or behavior. In other words, if you *think* the segment might have something to do with motivation but your not *entirely* sure, still code “yes”. This will allow more information to pass this filtering level and more into later coding and “interpretation” activities.

coders were more liberal, some more conservative. Thus, in week 5, the group discussed some sections where many people said yes, and where a few people said yes, as points of negotiation. This approach was not as punchy as the first uberreliability matrix, but participants were able to use the print outs to discuss and resolve disagreements in real time in the meeting.

**Tools:** The group used the uberreliability approach from the first “live” reliability exercise (see Artifact 4-4). Correlations and discussions, together with the code book and transcripts, were the main artifacts and tools used to mediate this negotiation. During the iterations of the code book, the faculty lead presented the group with correlations (Excel matrices) to pinpoint key points of agreement and disagreement. Pairs of coders then looked at illustrative segments in order to resolve the differences, and the group discussed the results. GoPost served as the primary workspace for distributing templates, submitting results, and summarizing. The faculty lead eventually changed the reliability heuristic going with a majority rules approach. Artifact 5-7 gives the correlation results for the last 15 transcripts. Each transcript was coded by two different coders.

The matrix indicates that Dana and Gail both maintained their conservative stances, as indicated by the low numbers of yeses for them. The methodological issues associated with reliability measures for such a large group of coders were not resolved by this group.

**Resolution:** The conservative versus liberal stance led to two negotiated outcomes that helped in the form of two rules in Version 1 (revised) of the code book:

the when in doubt rule and the continuation rule (originally the continuation rule applied when an answer spanned multiple turn taking events (TTEs). There was an interim code category, “maybe,” but the final Version 4 code book only had the when in doubt rule. Even the dissenters agreed to go with the flow, and the negotiated rules helped individual coders do their work without so much cognitive overhead. The general trend was to be inclusive, so that if there were a question, a segment was coded yes for the presence of motivation. The when in doubt rule helped the management team to keep the TTEs in the compiled results. However, they were flagged and later resolved by having an expert coder recode them.

The most conservative coder was Dana, she referred to herself as the farthest outlier because she was from another department. She maintained her conservative stance, combined with skepticism about the methodology, throughout. As Dana wrote in her final reflection:

*GoPost, Week 11: This research group has taken a very different approach to “doing something meaningful” with interview data. We have followed an iterative process of inter-rater negotiation of bias over multiple passes through a set of transcripts. With each pass we have attempted to minimize the biases between the raters and to increase the consensus of what the theoretical construct of “motivation” includes or excludes. We have codified this consensus in terms of the how we expect to see evidence of it in the transcripts and then used it to sort the transcripts. The strength of this iterative methodology involving many raters is that it solidifies a fairly clear and stable theoretical construct that the transcripts are being measured against. A weakness of this methodology is that inter-rater reliability is used as a measure of the consensus about the theoretical construct, rather than a validity check of fit between the theoretical model and what we are aiming to study or the existence of the phenomena we are aiming to study.*

Although some of the conflict involved in applying the proposed codes was caused by inexperienced coders and people unfamiliar with the theory, there were also

continuing disagreements about how the rules were applied and how much inference was resulting when making judgments, as indicated in Nelda's final reflection:

*GoPost, Week 11: Going through all the transcripts, except for a couple, I felt all the teachers were motivated and tried different approaches or at least showed that they were interested in student motivation. The codebook we had were more inclusive at the beginning which made it difficult to code. But this issue got resolved once we had modified versions of codebook. While I was coding, I felt that my coding could have /might get affected by stereotype prior to the coding process.i.e making an image or actually looking specifically for things to criticize on. But I guess everyone felt the same way.*

### **3. Hidden or Unacknowledged Negotiations in the HNG**

In addition to the lingering issues identified above, negotiation of roles and identities was hinted at in the final reflections written by the student participants. Negotiation of roles was important in the first weeks, and throughout the quarter. The tension associated with having to adopt new roles was mentioned in various ways in the GoPosts (take-aways, biases, etc.), e.g., Delilah mentioned having to shift from being a quantitative to qualitative researcher; Dana mentioned the multiple roles at play, student, teacher, researcher. These conflicts might be viewed as requiring personal negotiation solely, but they also had to do with participants' roles and identities as part of group and Vis a Vis the task of being a researcher. All the students had to get to that place of being a researcher at least for the remainder of the quarter moving beyond their student/teacher roles. The final reflections indicate that students who indicated that their interest in the group related to usability and user centered design maintained that stance in their take-aways (what they learned). Those participants who wanted to learn more about research framed their responses in that way, but with the addition of

what they learned about adjusting their roles. This dimension of identity and role is elaborated in the interview analysis in Chapter 6.

A related potential conflict for negotiation was students' discomfort with making knowledge claims based on their limited experience as qualitative researchers or lack of knowledge about motivation and teaching practice. The first exercises with the transcript segments raised a number of biases toward teachers, both positive and negative, e.g., whether teachers are valued culturally; assumptions about teachers' attitudes towards teaching.

Nelda's final reflection reflects this ambivalence about making claims about teachers and based on their words:

*GoPost, Week 11: "Since all the transcripts (all right?) were obtained from interviews with UW professors, I felt that there was more probability that UW will hire or have professors who are motivated to maintain student motivation as a part of their job and their interest.*

***I believe everyone has a different personality and psychology and it is very very difficult to analyze what someone might be thinking just by reading the transcripts of their interviews*** [emphasis in original]. *At times, I also felt guilty of distinguishing between professors and rating them whether they were concerned about students or not.*

On the positive side, the fact that the data set being analyzed was somewhat familiar to all is most likely a factor in getting novice coders up to speed quickly, supporting both production and learning goals. Teaching and learning in a university context were familiar constructs to all the participants. Although participants were initially guided by their own perceptions about these phenomenon the bias exercise and continuing conversations about inference helped mitigate the potential threats to validity from this familiarity. The ambivalence and changing understanding of teacher

and student relationships indicated a positive tension that served as a rich site for learning as the interviews illustrate.

#### 4. Chapter Summary

The negotiation analysis demonstrates how bringing the experience near and distant together helps to explain the role that negotiation played in the two groups. It illustrates important dimensions of the negotiations, including what was at stake, how potential and evident conflicts were avoided or resolved, or lingered, and how the groups used the regulatory and epistemic tools identified in the genre analysis in Chapter 4 in these negotiations. The key findings are:

1. The nature of the task or group process at least partially determined whether or not negotiation was present or not in the coding and article writing activities of the two groups; timing was another important dimension
2. Negotiations around epistemic conflicts, e.g., around concepts or viewpoints, were most common, which is not surprising given the focus on intellectual collaboration
3. These negotiations helped balance learning and production goals
4. Despite unresolved conflicts and lingering tensions, particularly surrounding methodological issues, the group was still able to proceed

These findings are discussed briefly below and in more detail in Chapter 7.

**Nature of the Task:** The negotiation analysis in this chapter suggests that the nature of the task or group process at least partially determined whether or not negotiation was present or not in the two groups. The first group, the LNG, relied more on a conversational model of knowledge construction in line with the exploratory nature

of the goals for the group. Negotiation was nascent in the rudimentary coding scheme that the LNG developed. The coding process involved facilitated group decision making activities that were intended to compensate for particular challenges of having to train a large group of novice coders and get them to speed in a short period of time. However, although the faculty lead used inclusive pedagogical strategies, it remained a highly directed and constrained form of collective decision making in which persuasion and buy in were crucial in order to achieve both production and learning goals. This analysis suggests that negotiation was both an intentional and emergent organizing and training strategy that proved to be effective in getting the group on the same page, increasing reliability, and allowing them to get their work done. Perhaps most important is the fact that negotiation is embedded in the type of coding being done and the tools used to do the coding.

**Prevalence of Epistemic Conflicts:** The fact that conflicts in viewpoint and concept were more prevalent than conflicts in interest in the HNG is not surprising given that my study focused on intellectual collaboration and not more contentious types of group tasks. The continuation of the dissenting opinion, in which Dana maintains her stance publically throughout the quarter, indicates that the negotiations around methodological issues did not fully resolve this source of conflict in viewpoint. However, the group was able to proceed anyway and get their work done. The reasons for Dana's stance, which she frames as her contribution, are explored further in Chapter 6. The interview analysis shows that this was a productive tension for the group in terms of learning.

The temporal dimension indicates that with the exception of the continuing methodological tensions most evident in the Gremlin's stance, most of the negotiating in the group took place in the first half of the quarter. The early negotiations were associated with training and group coordinating issues, whereas the latter part of the quarter entailed primarily negotiations about the data and finessing code book interpretations.

The artifacts/tools used reflect this difference, with the group relying on and negotiating the regulatory artifacts, e.g., the code books early on, but shifting to the use of the epistemic tools, e.g., the spreadsheet templates later on. The use of agendas remained critical throughout the quarter, because of their pedagogical goals of making processes visible to support reflection and knowledge integration by reminding participants what they had done and where they were heading, as well as capturing important regulatory agreements.

Furthermore, because of tensions identified in previous groups, the faculty lead headed off potential interest conflicts early on through the SWOT analysis and surfacing expectations and problem points. Examples of these potential sources of conflict include the issue of size, which was obviously a challenge in terms of getting everyone on the same page. In the LNG it was seen as an advantage in terms of bringing multiple perspectives to the analysis, one of the goals of qualitative research. In the HNG, size was viewed as a challenge in getting everyone on the same page and reaching acceptable reliability. Similarly, the availability of so much student labor was seen as a

positive benefit to the faculty lead and the research teams overall, but managing this labor remained a challenge.

Ownership, which featured prominently in the student-led TC article about the LNG because of the negotiation over author inclusion, did not emerge publically as an issue in the HNG. However, ownership in the sense of being vested in the group did emerge as a theme in the interviews. Furthermore, as discussed in the next chapter, the interviews revealed that there were potential conflicts in interest that were not taken up by the group, e.g., focusing solely on motivation, which meant that the difference coding was not finished, impacting the graduate student basing her thesis on this data. Other points of tensions experienced by individuals were not evident until the interviews. These types of negotiations are discussed in Chapter 6, together with selected outcomes associated with the public negotiation of the HNG.

## Chapter 6

### “Getting on the Same Page”: How Negotiation Contributed to Rigor and Inclusion

*The rhetorical view of knowledge construction is that knowledge is formed in interpersonal negotiation over interpretations of evidence rather than simply in the close individual examination of an unambiguous reality” (Winsor , 1996, p. 4).*

Naomi, undergrad: At first I was a little intimidated by everyone else’s experience level with research, but I feel as an undergraduate I was able to bring a fresh pair of eyes to the data and see things that may have been skipped over when you become too close to the data.

Glenda, graduate student: When I would code, match with other students stuff. A lot of students would code same way so ok my answers are not that dumb. Other people think the same. Feeling can fit in. I am like other people.

Delilah, doctoral student: I love this idea [referring to the code book] because when you are getting into qualitative social science you do want to make it as replicable as possible. You want to be able to hand this to a whole other research group and try to get at least similar results. Obviously they are going to vary a little bit. That to me elevates social science to a science is that there is a method. There’s a method that’s repeatable...that you hope other people get the same result. I really liked this, it fit my kind of feeling about what science means.

The previous two analysis chapters investigated the role that negotiation played in two signature research activities, coding and article writing, and the processes, work products, and mediating artifacts associated with those negotiations. Those analyses revealed that the prominence of negotiation in the second SEED group, the high negotiation group (HNG), related to the nature of the task and the goals, and strategies of the faculty lead and other management team members, the characteristics of individuals, and the norms and practices inherited from the engineering research community and the host department. An additional finding was that the coding

practices and tools employed in the HNG were more mature and helped solve some challenges raised in the LNG.

This chapter considers the value of the negotiations to individual participants in the HNG, in terms of the learning and other outcomes associated with participation in group processes. Based on a thematic analysis of interviews with a subset of HNG participants as described in Chapter 3, the chapter addresses the following research question:

**RQ 4: What do the interviews reveal about individual participants' experience of these task-related and possibly other types of negotiation?**

The following sections present a summary of the participants and describe their understanding of research, then look at outcomes associated with their participation in the code book rule and reliability negotiations, considering how rigor and inclusion were supported through the reliability negotiations. Continuing epistemological and methodological issues were best represented in the “dissenting opinion” maintained by Dana, who described herself as “the conservative little gremlin” (not a disparaging term; a legitimate epistemological stance). I discuss the implications of this role negotiation, a type of negotiation that was so striking it had to be added to my typology.

## **1. Overview of Interview Participants**

Although this study frames learning as a social and material practice, it is also an individual experience. This section introduces the cast of characters as individuals, those who participated in the interviews, providing an overview of how they positioned

themselves in the group as researchers and what they learned during the experience. These snapshot profiles are based on the interviews and incorporate the participants' self descriptions and reflections. Such an overview hints at common themes as well as variety. Most important, it gives a picture of just how much learning was going in terms of roles, identity work, and understanding of the norms of doing this type of qualitative data analysis.

In the interviews I had the opportunity to probe more deeply about learning outcomes as well as participants' understanding of the role of coding and reliability negotiations and their own roles in the HNG. I interviewed 9 of the 12 participants as explained in Chapter 3. Two of these individuals, Gail and Felicia, were also participants in the first SEED group. The pseudonyms below use the first letter of the names to designate the academic level of the participants, with two representatives of each level, undergraduate (N), graduate (G), doctoral (D), and faculty (F).

### **The Undergraduates: Nathan and Nelda**

Nathan had graduated and was looking for a job. Nelda graduated early and continued on in the HCD&E graduate program. Both were headed for careers in usability. Both reported having a variety of other research group experiences, but thought this one was much harder than the others. Both described the purpose of research as making things better.

Nathan was a model coder, always finishing first, so he could watch Sunday night football. His role in the group was to model being a good team player. Although he

didn't remember specifics of the coding process, he remembered it being a lot of work, because it involved a lot of reading, but it got easier after the code book was finalized. He learned a lot about motivation and thought that the reliability approach might be useful in his future usability work in getting users on the same page and motivated to use his materials.

Research was "a Diva word" for Nelda before this research group. She felt uncomfortable about making inferences (judgments) about people and what they were thinking based on their words. She said it was hard to be a psychologist and didn't like criticizing teachers, coming from a culture where teachers are respected. She felt that the negotiations, which she termed self comparison with other students, made her feel more comfortable making knowledge claims. She enjoyed being in the group and described her role as a student research assistant. She particularly liked seeing all the big numbers.

### **Master's Students: Gail and Glenda**

Gail has been involved in research since she was a freshman. She is now an embedded engineering researcher and moved from being an undergraduate to a doctoral student in HCD&E without a break. She is a long timer on the SEED project and was part of the management team in both groups. She named her role as being a "full participant."

Glenda, on the other hand, had never heard of a transcript or an abstract before participating in this group. She now understands the "ideology" of this kind of research.

She fully appreciated the importance of the norms and practices for doing usability research.

### **Doctoral Students: Delilah and Dana**

Delilah self identified as a former designer, a current teacher, and primarily a quantitative researcher. She had returned from industry to get her PhD because she fell in love with research. Dana was from a humanities department, but was not a total outsider because she had done work in technical communications, the former moniker of HCD&E, and work with engineering educators. Both of the doctoral students were interested in learning how to do interview analysis for their dissertation work. Both liked the coding process but would do it differently. They both felt that the concept of motivation was too abstract. Delilah described her role in the group as being a cog in the machine. Dana, who had major methodological issues, framed her dissenting voice as her contribution. She called herself “the gremlin.”

### **Faculty: Felicia and Frank**

Both of the faculty members are seasoned engineering education researchers with experience in doing collaborative research with peers and students, though Frank’s experience was with smaller groups. Both were trained as engineers. Felicia was the faculty lead and was operating in “crunch mode”. The National Science Foundation grant that funded the SEED study was wrapping up. She was under pressure to get a lot of data analyzed quickly. Her training as an efficiency expert showed her the potential benefits of having multiple coders working on the huge dataset. Frank, who is a faculty

member at a different university, was interested in the whole notion of motivation and was also interested in collaborating with the faculty lead. He was on sabbatical so came to several group meetings, but mostly participated electronically, via telephone or email.

## **2. Value of the Experience and Take-Aways**

This section reports on the overall experience for the participants and what they said they took away from the experience, i.e., what they learned. As is generally true in research based learning experiences, the participants reported that their overall experience in the HNG was positive to excellent. Several commented on the importance of learning by doing and having tangible outcomes. As Nelda and Gail described the experience<sup>1</sup> :

The round table discussion and the handout [agenda] that she gave us weekly helped us picturize what I was learning through the research group too and what else needs to be done and why any of the research is useful... It was very fast paced too, or it felt like I got a lot of stuff done compared to what I did in other research group, I was participating in analyzing, it's not like I was watching and analyzing for myself, but I was doing it for the whole study. I would say it was very intensive, I liked it a lot. Intensive was good, talk and get to work right away.... All of my research groups have been informal... you don't see the fruit I guess, and here you could.

Gail: You are actually in the group, doing the work, you're not just sitting hearing about it, or reading about how to do it, you are actually in there doing it, and at the end you see a final product, you see maybe a paper or a final paper or a poster, hopefully.

Participants' "take-aways" included learning more about how to analyze interview data and methods they would use in their own research or that proved useful

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<sup>1</sup> Interview quotations have been lightly edited for readability as discussed in Chapter 3.

in subsequent research methods courses. How they defined research varied widely, ranging from a discussion in a research community to a process for making products better. The experienced academic researchers – Gail, Dana, Delilah, Felicia, and Frank (one graduate, both doctoral students and both educators)—predominantly described research as a situated, rhetorical activity or as a process specific to a research community. Delilah described it solely as a process. She identified herself as a quantitative researcher as did Frank. The other three participants—Nathan, Nelda, and Glenda (both undergraduates and one graduate student), identified themselves as potential usability professionals. Some of their definitions:

Nathan: Research is analyzing things and creating something out of it. Take data, analyze it, get something out of it, make a conclusion then possibly make suggestions to create something better.

Gail: Oh man, that's an interesting question... so defining research...There is an area of interest, maybe a community...or a community is started... something unknown, or something that's known that they're going deeper into, trying to define more, or to apply a certain theory to... people exploring it, writing about it, talking about it, having these conversations, within the community, and with others as well...I think of that in our department as with others....yes we're all with HCD&E, but when you think about, there's [the faculty lead] in engineering education, go down to others who are in usability...there's such a spectrum of what people do.

Frank: Research is a formalized way of posing and answering questions that one hopes is of general interest to some community.... In my mind qualitative research is a type of research that looks typically at a small number of people in depth and characterizes some education question in a way...skirting issue...that is not primarily quantitative. Rather than looking at large databases of 500 people and what statistics tells us about their behavior to pick a smaller community and delve in depth on some issue.

The students reported having a better understanding of research in general and specific techniques and tools for analyzing interview data:

Glenda: [Goals of the group]: to have consensus, a high consensus on the codes assigned to the different lines (of the interview). [I now] understand that coding when interview someone, code and really understand what person is trying to say, have to see that there can be different interpretations, accurate interpretation, how educators take students into account.

How to code. I didn't know what a transcript was, learned what coding meant I thought coding was C++ programming. I learned that each line is important.

Nelda and Glenda both reported that the skills and tools that they took away from the research group were very helpful when they took the later research classes, e.g., they could talk about code books, knew how to code interview transcripts, and do their own analysis. The doctoral students were considering using similar methods in their dissertation studies. For example, Dana said:

Dana: As a researcher, I was evaluating whether or not that particular method of coding would be useful for me either specifically or some variant. Sorting out my own methodology. How it may or may not suit type of research want to do. [The research group] was useful from an experiential and educational point of view.

The participants also expressed an appreciation for the whole negotiation process, not just diversity but the interconnectedness. As Glenda expressed it:

Glenda: When I would code, match with other students stuff. A lot of students would code same way so ok my answers are not that dumb. Other people think the same. Feeling can fit in. I am like other people.

Other also felt that the processes and the faculty lead's style of participation led both to a sense of inclusion and a sense of confidence in making knowledge claims, as discussed below in roles. Although the three students who came to the group as usability types maintained this identification when asked about their future plans, Nelda illustrates the potential career pathway outcomes that educators associate with RBLEs.

She continued on to graduate study and considered becoming a researcher, concluding her interview with the following statement:

Nelda: I might become a researcher, who knows? It's fun.... I started to say no I'm not into research, then it's fun, then I might take more.

The variety of these experiences was also reflected in participant's understanding of the role of coding and reliability in conducting research. As seen through the eyes of the participants, the negotiations contributed both to rigor and inclusion. One participant expressed the point of coding to introduce rigor, another to remember to consider many different viewpoints, another to understand what users are thinking. The academic researchers had a lot to say about rigor and reliability and methodological biases as discussed in the following sections.

### **3. Uberreliability: The Effects of Negotiation**

Chapters 4 and 5 demonstrated the importance of artifacts and other tools in the negotiations in the HNG. In particular the code book (a regulatory document and an epistemic tool) and the reliability negotiations (an epistemic tool) helped get people on the same page in a short time frame. The result was a sense of buy in and collegiality. These tools also helped reduce cognitive load and supported individual cognition, e.g., decision making. Getting everyone, 12 coders, on the same page was a high bar, but it was worth it. As Nathan and Delilah summarized the experience:

Nathan: The high point and low point same time: when sitting there in a group trying to create definitions for certain words or topics that wanted to assign to each category. High point was everyone had to think on same page. Low point

was how long it took to get on one page. Disappointed couldn't get on same page probably due to different backgrounds.

Delilah: (First one I saw. [referring to the code book]. I love this idea because when you are getting into qualitative social science you do want to make it as replicable as possible. Want to be able to hand this to a whole other research group and try to get at least similar results. Obviously they are going to vary a little bit. That to me elevates social science to a science is that there is a method. There's a method that's repeatable...that you hope other people get the same result. I really liked this it fit my kind of feeling about what science means.

One of the roles that the early reliability negotiations played was to make results visible and to provide a common object/tool that allowed the group to move forward.

Nelda: I just really liked when...we coded our single interviews, or two people were coding it at one time, and then we put it up on the board and it was very interesting to see how close we were at some point and at some point how different we were and where our answers were different .... It's always nice to see what you're doing so if we hadn't done that, I wouldn't have known what other people are doing. It was a good summary, so I really liked it.

Delilah: I liked seeing the agreement rolled up that was pretty cool...who was I agreeing with on this one.

Participants, such as Nathan, Gail, and Delilah, expressed discomfort at beginning of the code book development but were reassured when they felt a set of standards and rules were agreed on. Delilah also recognized that the code book embodied an agreement not a resolution. She and others still had problems with applying the codes, which provide evidence that potential concept conflicts still existed, perhaps due to inexperience, perhaps due to the fact that the coding scheme was provisional. For example, although Nathan and Nelda felt that the rules were adequate for the job, Delilah and Dana both commented on the limitations of the code books:

Nathan: It pretty much gave me a set definition of what each category or subcategory was. That was a big help or else with so many different categories, I would have been lost.

Nelda: I wouldn't have been able to code without the code book.... It was very difficult at some point to pick that sentence as a vs f, but it was very easy because of this.

Delilah: And the first code book was really hard to deal with. It just wasn't precise enough. There was a lot of ambiguity. This killed me...[reading code book rule] "when in doubt not fitting the above..." it was just such a big bucket, when in doubt.

Dana: I felt like (just to go with the code book that's here) it was too finely tuned so that means two things. First of all it was just too exhausting. I think it asked the coder to hold too many things in his or her mind to look for. And secondly, it allowed far too much room for interpretation and that's where the biasing comes back in that I already mentioned. I found the subcodes sort of next to meaningless to assign.

However, participants did not feel under pressure to agree:

Delilah: So we would just have everyone in the group read the same transcript or two and talk about how they would code it. Do you think this relates to motivation, yes or no, and if motivation how would you code it in the code. Then we would talk about that's not what I mean by real world is that what you mean by real world or relevance and try to get a common understanding of what the words meant. That was the initial part of using the code just to make all the readers somewhat reliable and on the same page.

We all coded on our own then we came and basically either fought or didn't fight for something we felt strongly about...I didn't feel that strongly about everything so I was pretty easy to convince if it wasn't something I felt strongly about.

Frank: Ideally...we would have sat down and go line by line for all the ones where we disagreed and say well I coded it this way looking at it again do you agree with how I coded it? Are you comfortable coding it in a similar way or not. As I recall these conversations are always very (???) there was no push to get someone to change their mind.

In fact, people commented that they liked the dissenting opinions:

Delilah: I really enjoyed that she was coming from a different background. She had an entirely different perspective. I thought that was really helpful. I think sometimes if you are in a research group with everybody is drinking the same kool aid you end up not seeing some things.

It also led people to feel that they tended to agree with each other and they speculated about the reasons. Delilah talked about parallelism of experience. Nelda talked about same ethnic backgrounds.

Delilah: The negotiation was an import thing to witness...really surprised how little agreement there was with that many people. Found it interesting could clearly see patterns of people who tended to agree with each other more....seeing things through similar filter. Would be really interesting to look at what is their experience...parallelism in their experience

Participants mentioned a variety of strategies for dealing with overwhelm or uncertainty in applying the codes. Delilah coded in several passes; Dana just said no if she had to come up with an explanation. Nathan found the code book essential when writing the interpretations (mini-memos) about results. Asked how he got to the interpretations, Nathan said:

[I] elaborated on the definition [in the code book]..talk about it some more, worked backwards... try to make something out of what I did.

Overall, participants were satisfied that rigor was achieved, as was Frank:

I don't think it's reasonable to expect all of us would code the transcripts in exactly the same way, but we got to the point where there was a high degree of reliability at least in terms of what was pegged as having to do with motivation and then fairly good agreement on what bin it would go in. So I thought that the level of reliability was reasonable.

#### **4. The Gremlin and Lingering Methodological Tensions**

Some issues raised by participants in their reflective pieces at the end of the quarter remained prominent in the interviews, including lack of clarity about theories of motivation, ownership of research/investment in process, methodological disagreement

over how interviews can be used and the claims that can be made, also the tension between positivist research and more naturalistic methods such as ethnographies.

These tensions demonstrate that the negotiations did not eliminate such differences in viewpoint or the rules of engagement, i.e., the negotiations did not solve them. Dana, who described herself as “the conservative little gremlin,” carried the banner on behalf of lingering methodological issues, which involved unresolved conflicts in viewpoint and possibly concept. However, despite her stance she reported the overall experience as positive and would consider using student coders in her own research.

Dana’s undergraduate training was as an anthropologist; now she is grounded in the humanities. She questioned the value of the code book on theoretical grounds. She felt that although they were initiated with a theoretical framework in mind, the ultimate coding scheme and application were derived through negotiation between the participants, which she felt just magnified personal biases. Correcting this, would have required returning to an external theoretical framework to ensure validity. Similarly, she disagreed with the value of the reliability checks on theoretical grounds. Her take was that they were driven by desire to be more quantitative and cited them as evidence of tension between positivist and qualitative epistemologies.

She admitted that they were fun, but questioned the validity of anything that rested on eliminating 90% of the data as irrelevant, i.e., validity increased because coders more easily agreed when motivation was not present.<sup>2</sup> Although she liked the

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<sup>2</sup> Normal statistical measures of reliability don’t apply to such large groups, because measures such as Cohen’s Kappa don’t account for the steep decline in the probability of chance agreement when the number of raters goes beyond a few.

idea of having students to help her code, Dana thought that the size of the group posed methodological issues as well as practical concerns. She thought that collaborative research in studies in her field never involved more than three people. Her comment was that the ability to make mistakes, to collaborate declined:

Dana: One of the limitations of that particular group was its size. I don't think I've ever read a study at least in my field that has that many coders. Ten....more on the order of three or four. I think that was problematic to some extent ...the size of it. In my experience doing collaborative research, I have this little research group and there is three of us and that is tremendously successful over time in terms of the levels of trust that you can establish and the benefits of that trust which is really being able to brainstorm freely and explore multiple avenues of the project...make mistakes.

She expressed the belief that only the people who had collected the data, i.e., conducted the interviews, could properly interpret them. Furthermore, she thought that undergrads should be excluded from interpretation because of the nature of the datasets and how the interviews were used—because they weren't teachers.

Like Dana, other participants had concerns about their lack of domain knowledge and hence the degree to which the theory was really guiding the analysis. This issue was somewhat mitigated by the nature of the data set, since teaching and learning in a university context were familiar constructs to all the participants:

Glenda: I really liked the topic, understood it, sometimes don't understand what's happening in the class that's why don't participate. Understood what was happening was able to express ideas. The Instructor was encouraging, gave full attention, wouldn't degrade. [Later she described the topic; how engineering educators differentiate between students based on their race.

[Also the setting:] Before the group shy wouldn't talk, never spoke up or participated in other classes. Learned to communicate. Was able to communicate really easily, helped with my confidence. I think because of the setting of the classroom sitting closer to each other and then there weren't as many people [as a class].

Dana questioned whether students could code this data in any meaningful way:

Dana: Experience was mediated through multiple frames. Teacher frame – wide variety of students, undergrads, grads, faculty, staff – different levels of teaching and the academy. In the end in my opinion that worked against the research goals of the group but not necessarily the educational goals of the course. Certain undergrad students learned a lot about research. The variety of experiences and levels of students worked against research goals. Nature of the data interviews with faculty about their teaching. Decoding that data, answers to the questions requires....very slippery...commitment to various theories of language and what you can do with interviews. Not convinced anyone without some knowledge of faculty life can read that data and meaningfully code it.

Furthermore, this familiarity also meant that participants were guided by their own perceptions about these phenomena. As Delilah put it:

Delilah: One of the interesting things about trying to decode transcripts is you are decoding through your own filters, seeing things through your own experience...and then you are seeing everybody else filter it through their own experience ...you are so unaware of your own filters and constantly going ok how much of this is something that I am seeing because I have that experience and how really valid is what I am seeing.

Some people liked the numbers, the Gremlin was ambivalent. Dana kept asserting her concerns about the issues related to positivism versus a qualitative stance. There was a tension between the expressed value of considering multiple perspectives and the desire to get better agreement, e.g., eliminate difference. In fact, the coding approach used in this group and in the CELT/engineering education community is designed both as a data reduction technique and a way of quantifying qualitative data (Borrego et al., 2009; Chi, 1997).

The faculty lead, in the interview, acknowledged the issues surrounding the quantitative-qualitative divide. However, she felt that the correlations and other numerical tools were more about providing boundary objects to facilitate mean making,

providing what she calls “traction”—something that allows her to reenter the analysis when it is put aside, for example a results table. Such boundary objects are crucial in her mind to doing collaborative research: “[To] distribute across people/time [you] need an easy entrance back into the complexity of it.”

On the production side, her goal with the research groups is to: get to a boundary object level, encapsulating “what claims [are] to be made...how situate in theory. The distributed person power, both in terms of multiple perspectives and multiple coders, gives her traction as a researcher. Dana acknowledged the effort required in balancing these conflicting goals:

Dana: [She] made a lot of effort to include the undergraduate students in the process despite their relative lack of experience with the material...the process and the material and that's just effort that wouldn't have to be expended if it wasn't a teaching environment. Which is the point of these research groups is to be teaching environments though again it's not a bad thing. It is where the research outcome and the teaching outcome I think conflict.

In addition to managing people, the major challenge of this kind of qualitative data analysis for Felicia is the issue of audience: “You work so hard to get some findings, [it's] hard to find the time to make arguments.” Furthermore, working with an interdisciplinary group of researchers creates a “lot of tension about who [you are] making arguments to.”

## **5. Role Negotiation**

In addition to task-focused negotiations highlighted in Chapter 5, there was a different kind of negotiation that involved participants' figuring out their role in the group, what the expectations were for participation on the part of the management

team and the students, and how they positioned themselves vis a vis the group and the methodological decisions that were being made.

As expected from Scott, Atman, and Turns' (2001) study of coding, participants learned about teaching and teacher decision making, as well as the theoretical lenses of motivation and difference. Everyone mentioned something they learned about teachers, several participants mentioned that the experience provided the opportunity to reflect on their own teaching.<sup>3</sup> For some, moving beyond their institutional roles, e.g., student, teacher, and researcher, was difficult. As Delilah described the experience:

Delilah: A lot of members of the group were ex students of mine and so there was this ...always a power thing going on between instructors and students was less than ideal... really hard like being a parent...really hard to kind of get past those impressions you have of someone at a certain point...went both ways....

Since peers less than ideal. wanted to not dominate conversation. I was aware of...thinking about...edited a lot of what I said....edited a lot of how I approached things....if I was working in a team of people who came in as just peers probably would have been more argumentative at times.

In addition, these roles were intermixed with other roles in the group, for example, moving from student or teacher to peer, participant, contributor, and their roles with respect to future professions, e.g., researcher, teacher, designer, or usability professional (see Gee's, 2001, affinity and discourse roles).

Delilah: It was a great learning experience. Sometimes it felt for me like it was more about instructing the younger researchers and being such a naïve researcher myself, I felt like sometimes I don't want to be in the situation because I don't feel confident enough in own abilities to really help you.

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<sup>3</sup> The take-aways posted to the GoPost at the end of the quarter included changes in notions about teachers and teaching. This focus on teachers was not as prominent in the interviews, but I did not specifically ask about teaching.

Dana: Research in English very isolated, toil alone. Idea can scale research by having group of people working together find appealing. Reduces burden on individual. More collaborative, more fun.

Several participants mentioned that Felicia modeled how to maneuver these roles, helping them to do so. They liked the combination of inclusion and direction:

Gail: [Felicia] is a total change, she teaches more reflective, let's talk about it, let's have these group meetings, everybody contributes equally, yes she might talk more than somebody else, but not compared to undergraduate [classes]. She wasn't writing on the board, leading us, it was equally leading us thru this data to come to a goal.

Glenda:...not right or wrong, opinions. [Felicia] would explain everything and lead the class just like a professor. Would code stuff, became a partner, she was like a student. Only difference was classroom setting.

They also learned about motivation, and how to motivate students or users. Nathan and

Glenda described the relevance to user experience work as follows:

Nathan: How people think of our software (I guess usually) if people on same page about software can say if this button does this or that button does this and if enough people say this does not look like this button should do this then know we need to change it as reliability percentage low. Want to say I want to be able to motivate these people into doing it but think tough to incorporate usability and motivation.... Time frame for interaction is short.

Glenda: My goal [I want to become] a usability engineer, so in different usability research jobs that's what you are doing all the time, you have different products trying to design it in a really good way, for that you need to know what good design means, and good design is whatever most of the people like using, that's why need to understand your users. And so that is how it's going to help me, it gave me this understanding good design, bad design, how important to get a person's input through interviews.

The faculty lead felt a strong tension between her role as researcher and teacher, asking: "Do we take time to reflect or make a results table?" Asked about what learning versus producing meant to her, Felicia replied:

Whether I think you are a student or I think you are a worker bee, to support the educational mission of the university to make you into a researcher or whether I need a larger work force. Might translate into how much time I spend reflecting, how transparent I make the process, different interpretations, or get impatient just move on.

Commenting on the code book rules, if she had more time, she would have provided a theoretical explanation behind the codes rather than just “a concatenation.” The purpose being to promote transparency in support of learning as well as contributing to rigor. Unfortunately in a single quarter: “Not a lot of bandwidth for us to figure out....how to slow down.” Surprisingly, it seems that the reliability negotiations did slow things down and allow the learning to occur.

## **6. Chapter Summary**

The interview analysis confirmed the findings from the previous two chapters that participants had generally positive experience and that they not only enjoyed the negotiations in the group, they viewed them as contributions to rigor. Most participants felt that the code book helped their decision making, with notable exceptions. The interviews revealed additional details about the variety of individual experiences and the effects of participating in the negotiations. The major findings were:

- 1) There was significant learning happening and the reported gains were consistent with the body of research on impacts of research based learning experiences.
- 2) The reliability exercises in particular supported both reflection and reflexivity. Thus, students learned not only about concepts and techniques but about important norms of doing this kind of qualitative research, including the importance of reflexivity and allowing multiple perspectives. Learning to think like a scientist, they also appreciated the ways in which the reliability negotiations contributed to increased rigor.

- 3) The difference between novice and expert was not sufficient to explain the types of role negotiation at play, neither was the difference in level in school.
- 4) Disciplinarity matters—the lingering methodological differences can partially be explained by the different disciplinary grounding of the academic researchers in particular.

The issues of size and role negotiation were particularly pertinent. Despite these continuing tensions and lingering methodological issues, the group was able to be productive anyway. Most notably, negotiation contributed both to increased rigor and a sense of ownership and inclusion in individuals, thereby supporting both production and learning goals. Surprisingly, participants did not comment on the benefits of learning to do teamwork, though they did say they liked working with other people.

The interview analysis provides evidence that negotiation activities provided the opportunity for students to try out disciplinary and professional identities, e.g., as a usability professional or academic researcher. In addition, the reliability exercises helped students see what others thought, supporting reflection and knowledge integration in real time. This factor potentially mitigates the short-time frame and focus on production, which participants in the LNG said limited the time needed for reflection, impeding learning for some.

## Chapter 7

### Discussion and Conclusions

*To focus on institutional and extrinsic measures of success for UR [undergraduate research], rather than on students' personal, intellectual, and professional growth, is to miss the point (Hunter et al., 2007, p. 72).*

Nelda, undergrad: Coming from a high context society, we give respect to teachers. I learned to overcome the bias that I have, that all the teachers will be good. I could see all the different views of all the students.... You don't hear the feeling there [in the transcripts]...I felt a little bad to judge people...not hearing or seeing...I'm pretty sure it was designed for the best.

Dana, doctoral student: What is empirically more valuable about a negotiated consensus of several raters, other than for development purposes, as opposed to the openly biased take of the single researcher who is likely to be steeped in the theory of the field as well as have a large investment in the field of study? Having more minds put to a problem is certainly valuable in terms of increasing the complexity of the discussion, but it isn't clear that it contributes to articulating a closer approximation of "what is really out there," the foundational epistemological claim of empirical research.

This study demonstrates that negotiations are productive sites for studying the construction of meaning, as Flower (1994) suggested. Adopting negotiation as an analytic lens illuminated the processes by which students benefited from participating in research based learning experiences (RBLEs). In addition, the analyses contributed an understanding of epistemic gains from this different kind of intellectual collaboration. There was significant learning happening and the reported gains were consistent with the body of research on impacts of participation in faculty mentored research experiences (Lopatto, 2004a, 2004b; Kreber, 2006; and Hunter et al., 2007). My study adds to this body of work by illuminating outcomes relating to students' intellectual development, particularly an understanding of the norms and practices of doing

qualitative research. Students learned to “think like a researcher” in addition to learning to do qualitative data analysis. These higher order gains, hoped for but not commonly found by other researchers, appear to be associated with participation in negotiated activities, particularly the reliability exercises. These activities involved multiple perspectives, collaboration with participants with different levels of experience, and tools and processes that provided common objects for negotiations.

Section 1 of this chapter summarizes and discusses negotiation processes, beginning with a reflection on negotiation as an analytic lens for studying intellectual collaboration and the ways in which it was particularly fruitful. The next two subsections discuss the specific findings from my three analyses related to negotiated processes and tools in the two research groups and the broader significance of findings. Section 2 of this chapter turns to the student experience and the gains associated with the negotiated processes. The discussion focuses on the higher order learning outcomes related to “thinking like a researcher” that arose from the disciplinary and methodological tensions in the second group. Section 3 revisits the purposes of the study and presents conclusions and the broader implications of the findings for designing effective research based learning experiences. The chapter concludes with a discussion of the generalizability of the findings to other settings.

## **1. On Negotiation Processes and Tools**

Negotiation as an analytic lens helped bridge the production and learning aspects of my data. It also helped bridge the conceptual and methodological approaches

of social scientists, who focus on group interactions and artifacts, and educational researchers, who focus on individual experience. Thus, the lens of negotiation helped surface and integrate the processes and experiences that Hunter et al. (2007) deem so important to advancing knowledge about effective undergraduate research experiences.

### **Negotiation as a Lens to Study Intellectual Collaboration**

Flower (1994) demonstrated that negotiations are potentially powerful sites for student development, agency and social interactions. As Hunter et al. (2007) explain, constructivist pedagogies assume that negotiation of shared meaning is a process that underlies student learning in research experiences. However, how shared meaning is enacted as a group phenomenon has been largely ignored in studies of RBLEs. The notable exception is the importance that has been attached to the student's relationship with a faculty mentor and to a lesser extent with their peers (Hunter et al., 2007; Kuh et al., 2008; Seymour et al. 2004).

As described in my analysis chapters, negotiation emerged as a significant process from the language of participants and the activities associated with the coding approach used, particularly in the second group. Flower (1994) suggests that negotiation moments are likely to be brief in learning contexts. I had the advantage of studying groups in which agreements and disagreements were central to the type of coding being done. Because both SEED groups were large in terms of research groups (9-12 participants), there was bound to be numerous sources of tensions and disagreements.

My negotiation framework helped me identify and describe how negotiations were enacted in the group. For example, my analysis of the artifacts produced by the first group revealed that there were tensions associated with differences in goals and schema on the part of the management team and the student participants. These differences were not discussed in any depth, nor were they negotiated. Furthermore, the student-led TC article<sup>1</sup> identified these tensions as potential sites for learning, it did not reflect on gains for individuals. Furthermore, the learning processes were only specified at a high level and learning outcomes were not discussed. As the authors of the faculty-led TC article wrote:

*The nature of the groups' activities to date suggests a range of potential learning outcomes associated with participation in the research groups including the opportunity to develop a wide range of research skills, to develop an identity as a researcher, and further, to acquire intellectual and professional skills beyond research (Turns & Ramey, 2006, p. 304).*

In order to know how different individuals experience and benefit from these research groups, we have to ask them. However, as Hunter et al. (2007) note, epistemological gains are likely hard to identify and articulate, both for researchers and for students. My negotiation framework puts the focus squarely on epistemic practices, the knowledge making practices and tools in the two groups, which helped reveal the higher order intellectual (epistemic) benefits that have not been seen in other studies. My focus on material practices allowed me to talk to participants in the interviews about their experience and the impacts of the practices and tools associated with the group negotiations. The artifacts made the work practices visible to them and me. These

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<sup>1</sup> In this document, I refer to Larson et al. (2009) as the student-led TC article and Turns and Ramey (2006) as the faculty-led TC article, respectively.

common objects, the regulatory documents and epistemic tools which served to coordinate the group's work, also provided a sort of group memory, which stimulated recall during the interviews.

This use of artifacts is potentially a good technique for future study of student gains in other learning by doing experiences.<sup>2</sup> As discussed at various points in this document, educational researchers often ignore the material practices associated with learning contexts. Even Flower (1994), who describes the intensive use of artifacts by students in her writing studies, does not elaborate on the mediating or regulatory forces associated with these tools. As discussed below, genre analysis can help reveal both the processes and outcomes associated with learning experiences.

### **The Processes and Tools of Negotiation**

*To gain insights into the principles on which "good" research experiences are based, we also ask 'By what processes (i.e., 'how') are such benefits achieved?' This involves inquiry into the nature of working relationships with faculty and peers that characterize students' research experiences, and the significance of other processes that shape outcomes for students—whether planned by faculty, structured by departments, or arising from the nature of effective research experiences (Seymour et al., 2004, p. 500).*

The negotiation analysis indicated that negotiation was an important process in balancing production and learning goals. Negotiation was both an intentional and emergent organizing strategy associated with the coding approach used, serving as a training tool and a way of improving reliability in the analysis. My negotiation typology

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<sup>2</sup> Researchers of writing practices, such as Katz (2002) and Odell, Goswami, and Herrington (1983), have used a discourse based interview format which surfaces tacit knowledge embodied in artifacts.

revealed that the first SEED group relied more on a conversational model of knowledge construction in line with the exploratory nature of the goals for the group. Negotiation was nascent in the rudimentary coding scheme that the first group developed.

Negotiation was embedded in the approach used in the second SEED group. The coding approach and tools were much more mature. In this iteration, the coding approach was a hybrid inductive and deductive approach that was guided by well-known theories about the phenomena of interest.

This method reflects the approach used by the larger research community in which the SEED study was embedded and is primarily aimed at converting qualitative data to quantitative data. Further, the coding process involved facilitated group decision making activities that were intended to compensate for particular challenges of having to train a large group of novice coders to get up to speed in a short period of time. Although the faculty lead used inclusive pedagogical strategies, it remained a highly directed and constrained form of collective decision making in which persuasion and buy in were crucial.

The mode of participation was inclusive and participatory in both groups, but the nature of the tasks in the second group required more interdependence in order to meet production and learning goals within the time frame of the academic quarter. Participants had to get up to speed in terms of learning how to code in this short time period, they had to “get on the same page” (a phrase used frequently by participants in the second group; infrequently in the first) regarding norms, roles, and how to do the tasks optimally. Although some participants in the second group saw the code books as

embodying a set of rules, others viewed them as a set of agreements. Despite lingering tensions, the group was able to move forward and code the entire set of transcripts.

Embracing conflict seems to have supported learning objectives and promoted a sense of collegiality and inclusiveness. Being participatory and inclusive does not necessarily rule out conflict, which can be generative. My analyses provide evidence that tensions between production and learning goals were managed productively, particularly in the second group, leading to successful outcomes (defined by the participants), such as research results and learning new ways of participating in group learning experiences.

The participants in the first SEED group raised the issue of the tension between production and learning goals, which I revisited in my analysis of the activities of the second SEED group. The negotiation analysis was particularly revealing about how potential tensions were either headed off or negotiated through exercises like the bias, goals, and strengths, weaknesses, opportunities, and threats (SWOT) exercises. The amount of work required on the part of the faculty lead to balance these goals was evident in the agendas and the other types of written and oral feedback given to the group. The prevalence of negotiation in the second SEED group can possibly be seen as a measure of the degree of work required to coordinate the group's activity. As discussed in Chapter 6, this level of effort was strongly felt by the faculty lead and commented on by Dana, who felt that having to attend to student's learning needs actually interfered with the quality of the research.

Others felt that the reliability exercises contributed to both inclusion and rigor. My analyses suggest that these tools: 1) surfaced misconceptions and conflicting schema (e.g., conflicts in concept and viewpoint); 2) slowed down the process supporting reflection in real time; 3) elicited multiple perspectives; and 4) provided the opportunity to reflect on the self as instrument of analysis. These opportunities were missing from the first group, as the participants wrote in the student-led TC article<sup>3</sup>:

*Although the students in the research group generally found hands-on experience with real study data helpful in understanding how qualitative research is done, it is easy to imagine that misconceptions about the nature of this research family [qualitative analysis] remained after the research concluded and the group disbanded. Indeed, misconceptions were sometimes revealed in coding exercises and subsequent discussions, yet we did not attempt to systematically uncover these misconceptions (Larson et al., 2009, p. 174).*

The benefits associated with the negotiations in the second group listed above potentially mitigate the short-time frame and focus on production, which participants in the first group said limited the time needed for reflection, and thus impeding learning for some. Berkenkotter and Huckin (2004) assert that such generic practices represent a sort of distributed cognition. The tools and exercises helped distribute the work among the participants as well as the management team.

As did Flower (1994), I found that novice versus expert, i.e., distinguishing between participants based on experience, did not account for the variety of learning outcomes and strategic thinking among individuals. For example, the undergraduates and some of the experienced researchers saw the code books as providing rules which made their decision making easier. The two doctoral students interviewed both found

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<sup>3</sup> In this document, I refer to Larson et al. (2009) as the student-led TC article and Turns and Ramey (2006) as the faculty-led TC article, respectively.

that the number of bins, i.e., the categories embodied in the rules, complicated their decision making. Dana's strategy was to just say no if she had to spend too much time interpreting the codes. Delilah coded in several passes, addressing each code separately.

Adopting new roles was a challenge for participants in both groups. However, the interviews with participants in the second SEED group revealed roles not obvious from the other analyses, particularly the ways in which the participants were exploring their disciplinary identities. Proponents of constructivist pedagogies such as RBLEs question the traditional role of teacher as expert and student as novice, and transmission as the mode of learning (Castley 2006; Prince & Felder, 2006). However, my study indicates binary representations are far too simplistic to account for the multiple ways in which participants in the second group were negotiating roles and participation, which involved more than a simple teacher-student role shift.

Even the faculty members had learning goals. Furthermore, everyone had to consider their multiple institutional roles (Gee, 2001), as teachers, students, and researchers. Everyone had to adopt multiple roles, but peer or co-participant was one that was particularly salient given the collaborative nature of the coding process. Comparing those participants who primarily identified themselves as usability types with those who identified as academic researchers was a more fruitful way of looking at similarities and differences than their levels in school. These differences might be explored further by revisiting the concept of affinity versus institutional roles. As Gee explains, "For members of an affinity group, their allegiance is primarily to a set of

common endeavors or practices and secondarily to other people in terms of shared culture or traits” (p. 105).

### **Significance of Generic Practices and Tools**

. My study confirms the findings from other empirical studies regarding the work of genres in the professions and Smart’s (1998 and 2006) research on intellectual collaboration that generic tools and practices are integral to the creation of specialized knowledge in groups. The coding process involved facilitated group decision making activities and tools that were intended to compensate for particular challenges of having to train a large group of novice coders to get up to speed in a short period of time. Although the faculty lead used inclusive pedagogical strategies, it remained a highly directed and constrained form of collective decision making in which persuasion and buy in were crucial.

In the second group, the regulatory documents—the code book and agendas—helped both to coordinate the group’s work and to create a sense of inclusion. The use of the epistemic tools—the code books, templates, and transcripts—was integral to the negotiation of shared meaning and the resulting production of new knowledge. This new knowledge included results about how educators take student motivation into account (themes and examples), as well as insights such as the importance of the social world.

My early analysis of the second SEED group compared with similar previous research groups doing qualitative data analysis indicated that the use of tools and

negotiation activities helped move the group along more quickly. In particular, the development and use of a coding protocol—a code book and rules for application—reduced uncertainty and cognitive load for the coders, increased reliability among coders, and contributed to a sense of ownership and collegiality in the group. The code book negotiation and reliability exercises helped train novices quickly and allowed them to transform a large amount of raw interview data into structured, usable research results.

These findings extend Winsor's (2007) work on regulation, which demonstrated that regulatory documents are important in interactions between groups. However, regulatory documents also are important in intra-group interactions, particularly in heterogeneous groups, as this study demonstrates. Winsor studied texts used in competitive bargaining situations such as labor relations negotiations. Rather than view differences in participants' goals or understanding of the task as inherently disruptive, in cooperative groups tensions arising from such differences are potentially productive if participants are able to negotiate their differences. The interviews demonstrate the value to the participants of the tools and genre knowledge acquired, both for personal growth and future professional endeavor. The interviews also demonstrate the cognitive and interpersonal benefits of having a code book that was mutually negotiated and captured the agreements and decisions made by the group.

### **Significance of Lingering Methodological Tensions**

While the negotiation of the code book rules and the reliability negotiations contributed to shared meaning, they did not resolve the lingering issues about the rules of evidence, competing methodologies, qualitative versus quantitative approaches, or

different disciplinary stances on the purposes of research. What remained unresolved were conceptual conflicts regarding the ground rules for the analysis and the nature of the claims that could be made based on the evidence. The understanding of research among the more experienced academic researchers (the doctoral students and management team) varied from those who viewed it as a situated, rhetorical activity and those who described it as a defined process. The latter identified themselves as quantitative researchers. The other participants, undergraduate and graduate students, identified themselves as potential usability professionals.

Everyone had concerns about their lack of domain knowledge and hence the degree to which the theory was really guiding the analysis. This issue was somewhat mitigated by the nature of the data set, since teaching and learning in a university context were familiar constructs to all the participants. However, this also meant that participants were guided by their own perceptions about these phenomena. The “Gremlin” kept asserting her concerns about the issues related to positivism versus a qualitative stance. One participant expressed the point of coding to introduce rigor, another to remember to consider many different viewpoints, another to understand what users are thinking. My analyses revealed a number of points of tension between the expressed value of including multiple perspectives and the desire to get better agreement, e.g., eliminate difference.

There is also something crucial about the fact that qualitative research in this instance involves working with human subjects. In discussing the challenges of negotiating (their term) the complex role of the researcher, Breuch, Olson, and Frantz

(2002) write that: "Because we study people...as researchers, we are all challenged to carefully evaluate ourselves as well as our participants, and the highly charged interpersonal space between us" (p. 15).

Participants in the second group interpreted what educators' words meant by relating them to their own experiences. This interpretation raised the issue of the inverse of multiple perspectives, which is the role of bias. Thus, the coders had to reflect on their own biases, which included their preconceptions about teachers and teaching at this particular university. Some remained ambivalent, as Nelda, an undergraduate, commented:

Coming from a high context society, we give respect to teachers... I learned to overcome the bias that I have, that all the teachers will be good. I could see all the different views of all the students.... I felt a little bad to judge people, not hearing or seeing, I'm pretty sure it was designed for the best.

Reflexivity, according to King (2004), "refers to the recognition that the involvement of the researcher as a participant in the research process shapes the nature of the process and the knowledge produced through it" (p. 20). In this group, ensuring reflexivity also promoted reflection, and possibly good learning. The fact that these reflections are shared with the group adds to the trustworthiness of the activity (Bowen, 2005; Creswell; 1998). In this case, production and learning goals were in alignment.

## **2. Thinking Like A Reseacher: Higher Order Outcomes**

The most common finding across studies of research experiences is that students gain: 1) an increased understanding of how research is done and 2) an increased

confidence in being able to do research and contribute to research (Seymour et al., 2004). In their studies of summer science research experiences, Hunter et al. (2007) found that these increases in confidence resulted from having developed a collegial relationship with a faculty mentor, working alongside them as participants. They also found some evidence that collaborating with peers contributed to increases in confidence.

Similarly, students in my study reported increased confidence in their abilities to do research. More importantly, this confidence was associated with participation in the group's negotiations, particularly in the reliability exercises that allowed students to see what others were thinking. This is significant because participants were not individually mentored by faculty but still reported similar gains in their personal development to participants in more elite and intensive research experiences.

Hunter et al. (2007) also found that "although most students developed the capacity to usefully apply their scientific understanding to their research projects, few developed either the capacity to generate and frame research questions such that they can be approached by alternative scientific methods or a complex epistemological understanding of science." (p. 48). The faculty mentors they interviewed asserted that this more complex epistemological understanding of science doesn't develop in most students until graduate school. Although not explained, the reasoning behind this stance is presumably an assumed model of how students develop during college. Baxter-Magolda (2004) on the other hand, has shown that the processes used in higher education limit the ways that students develop epistemologically. She suggests that

alternative learning contexts, e.g., those focused on knowledge construction explicitly, might accelerate this development. Both SEED groups are exemplars in this regard.

In the student-led TC article, participants from the first SEED research group asked: “How can they [students] grasp the epistemological implications of qualitative analysis when involved in the minutia of coding?” (Larson et al., 2009, p. 174). They surmised that the emphasis on production versus learning, epitomized by the emphasis on article writing near the end of the quarter, took away from reflection. They suggested that the need “to go meta” was not accommodated in this context, and that perhaps a research methods course would be better suited to this end.

Negotiations in the second SEED group indicate a sophisticated epistemological awareness about reflexivity, an important norm of qualitative research, as well as methodological issues. Students’ reflections on the negotiations and tensions support the claim that there was higher order thinking about research going on. For example, the early negotiation in the second group over the focus of the research involved students in the research design in a non-trivial fashion (see Negotiation 2 in Chapter 5).

In 10 weeks, the guiding question went from “How do designers keep the user in mind when designing” to “How do educators take motivation into account.” In order to answer these questions, i.e., to code reliably, students had to understand the concepts behind the codes as well as the rules of application. Furthermore, they had to come to terms with the amount of interpretation involved. It could be that qualitative inquiry potentiates the kinds of epistemic conflicts that were evident in my study.

As Geisler (2004) explains, reliability is not just about agreement, it is about the trustworthiness of the researcher as instrument of analysis. Thus, reflecting on issues such as reflexivity and rules for interpretation that were raised by the negotiations led to a deeper understanding of important norms of qualitative research. The students' discomfort with making inferences about people based on their words was productive.

It could also be that the size and diversity of participants led to a better understanding of the key concept of reflexivity. As demonstrated in the analyses chapters, the reliability exercises promoted a kind of reflection in action (Schön, 1990) that was commented on by many participants. Another factor contributing to more complex thinking could be the presence of graduate students and research scientists. Working alongside graduate students as well as faculty might have allowed them to reach these stages earlier than they would otherwise. The epistemological understandings did seem to be more complex and perhaps deeper for the doctoral students than the other students. However, even the undergraduates expressed an awareness of the challenges of being reflexive, as Nelda demonstrated.

This explanation is similar to the claim of Hunter et al. (2007) that apprenticeship- like experiences support deeper thinking. The findings from my study support the assertion of the host department that the vertical integration, the presence of researchers of varying levels of experience and level in school, contributes to their success (Turns & Ramey, 2006). However, since these groups are preparing students to do academic research primarily, the gains might be stronger for those participants who already identified themselves as academic researchers. The role negotiation evidenced

by my interview participants complicates this explanation. It does, however, raise some issues about career preparation.

Benefits for career preparation was a strong finding by Hunter et al. (2007) across the colleges they studied. This benefit was true whether or not students intended to go on to do graduate research since students recognized that employers would value their research experience. The benefits for career development in their study may be particularly strong because students were paid employees in their research labs. In fact, for many, the research experiences were their first full-time paid jobs.

My study also showed some benefits in terms of careers. The students in the SEED groups were asked as a final homework assignment to write an “elevator speech” about what they learned and to comment on the relevance to their future careers. Everyone felt the experience would be valuable in some way, although the undergraduates did not know what their future careers would be. In my interviews, I asked students about their career plans and the relevance of their participation in the SEED groups to their futures. The academic researchers found that the experience had provided them with research skills that would benefit their future research.

A key characteristic of the two SEED groups was that the research was collaborative. This quality potentially contributes to the relevance of the experience, particularly for students in the host department. Many of them are bound for industry, even at the doctoral level. One of the most frequently touted competencies required for engineering and knowledge work in other professions is the ability to contribute in cross-disciplinary teams. Learning how to collaborate is an important skill that the

students did not comment on in their interviews, although they did say they liked working with other people.

### 3. Conclusions

This case study challenges the notion that learning to do research always requires a long, difficult, and tacit enculturation process. These groups were examples of scaffolded learning experiences that are designed to get multiple novice researchers up to speed quickly in order to meet both production and learning goals. Using negotiation as a central organizing dynamic, together with the use of specific tools to support collaboration by making potential epistemic conflicts visible and thus negotiable, seemed to slow down the process and effectively get people on the same page. The evidence that negotiation processes also led to an inclusive environment (intrinsic motivation) increases the likelihood that students will actually learn and be able perform effectively despite the short time frame and complexity of the tasks.

Prince, Felder and Brent (2007) suggested that, given significant resource constraints, course-based inquiry methods might be a better way of promoting the same outcomes as research experiences in a wider range of students. These more *limited research experiences may allow students to obtain problem solving skills and a basic understanding of how research is done.* However, it is not likely that students would achieve the same affective and intellectual gains that Hunter et al. (2007) attribute to learning by doing experiences. My study suggests that participating in a group experience in which differences have to be negotiated, and roles and identity are in play, can result in more complex intellectual outcomes for students.

My findings demonstrate that students were aware of important epistemological issues associated with the task of coding as well as with larger issues of research and knowledge construction. The fact that students engaged in reflexivity and were aware of the norms of doing this kind of qualitative coding suggests that significant professional socialization was going on. The faculty mentors interviewed by Hunter et al. (2007) describe learning about attitudes and characteristics that mark a researcher as “learning to think like a scientist.” In the second SEED group, “learning to think like a researcher” involved more than individual identity work. It involved identity work associated with developing competency in the group and the larger community of practice. This is a desirable outcome in RBLEs, as Hunter et al. (2007) and others have demonstrated.

Although one quarter is not enough time to get everyone up to speed and operating as independent researchers, this study suggests that negotiation focused on common objects may allow novices to function effectively as collaborative researchers in concert with more expert participants. The sum is greater than the parts...the genre knowledge acquired serves as an access point to distributed and situated cognition and expertise (Berkenkotter & Huckin, 1995).

Given more time, it seems likely that the group could have tweaked the coding process to eliminate or mitigate conflicts surrounding methodological differences, e.g., conflicts in concept and viewpoint. In fact, members of the management team “broke down the codes” (Geisler, 2004) further in subsequent quarters and reconciled differences. However, there are times when positions cannot be resolved without appealing to an outside authority, hence Dana’s suggestion that a better understanding

and grounding in the theory would have helped. Some other ways of reconciling this type of disagreement in the larger community entails handing over the disagreements to an expert coder, who decides on the preferred solution.

It is important to recognize the role that disciplinarity plays in determining how students might learn to do research by doing research since disciplinary forms of inquiry vary in terms of how they can be integrated into student learning activities (Griffiths, 2004). An important issue raised by the lingering tensions over methodology is the fact that the management team did not articulate their assumptions about research or the guiding principles in their disciplinary epistemologies (Repko, 2008). In fact, the HCD&E Department is a highly multidisciplinary department but has not engaged in the process of articulating these assumptions and principles, which might support an interdisciplinary integration of knowledge. Repko (2008) suggests that such understanding comes from taking advanced methods courses and from disciplinary enculturation. One area for more effective practice in conducting research groups could be to articulate these principles.

Another area to reconsider would be the emphasis on article writing as the gold standard of academic research productivity. It may be that highlighting other kinds of work products may be important for novices, for example, the tools and results. Devers (1999) cites one of the emerging purposes for research is to serve the needs of the researchers, moving beyond the primary focus on dissemination to official discourse communities. Broadening the definition of research may indeed make it more inclusive,

both in terms of more students being able to participate, and in terms of their sense of ownership, having developed new knowledge in a variety of ways.

Part of my purpose in studying these groups was to consider how to design more effective and equitable RBLEs. My contention was that by understanding the challenges for students in these learning by doing contexts, as well as how the faculty lead addressed these challenges, my findings might help educators be more effective in the time they do have to spend on working with students on research activities. My study suggests that structuring group activities around negotiation processes led to an inclusive environment that increases the likelihood that students will actually learn and be able to perform effectively despite the short time frame and complexity of the tasks.

In fact, some of the tools helped balance the tensions identified in the student-led TC article and challenges associated with learning to do qualitative data analysis identified by department representatives in the faculty-led TC article. It can be imagined that the practices associated with developing the epistemic tools—the code book and uberreliability exercises—that took up much of the early work of the second group could be refined and once mastered would reduce the work load for the leader of similar research groups.

These findings suggest the following practical implications for designing research groups focused on decision making/judgment tasks include the following:

- Let problematic issues, e.g., differing goals or disciplinary stances, be subject to negotiation; embrace the conflict
- Actively construct negotiation moments
- Carefully select the coding approach and tools; negotiation is embedded in both
- Include students of all levels and both novices and experts if possible

- Articulate disciplinary norms and principles or allow them to surface through negotiations
- Consider negotiated activities as a technique to support graduate education in research and other inquiry-based activities

This study contributes to an effort to identify effective practice in RBLEs that is grounded in research-based evidence. It responds to the call by Hunter et al. (2007): “Our hope is that a better research-grounded understanding of what constitutes the character and significance of student gains and the processes whereby these are generated in the array of academic and contexts and types of UR [undergraduate research] experience available to students will allow the community of UR practitioners to move forward in meaningful practice and evaluation of their work” (p. 72).

#### **4. Relevance to Other Settings**

Studying knowledge construction and intellectual collaboration using the lens of negotiation could well be fruitful in other settings involving epistemic work, particularly when novices are involved. This study demonstrated that the lens of negotiation can: 1) illuminate potentially rich sites for knowledge construction, 2) characterize group dynamics in the process of conducting task-oriented activities involving interdependence, and 3) connect group activities and individual participation in the processes, as well as outcomes for participants.

The most likely source of difference in another setting would be the rule structures being negotiated. In the SEED research groups, the epistemic conflicts arose from differences in the explicit rules for evidence and norms and practices of doing this

type of research in different disciplines. In addition, the types of roles being negotiated and issues related to identity should be different in other disciplinary contexts and non academic settings (see Gee's, 2001, affinity and institutional identity categories). In my study, the participants were mostly novices at doing this type of qualitative coding, but at least half the participants in the second group could be classified as experienced researchers. Everyone in the second group had learning goals, including the faculty.

The participants in the first SEED group identified a tension between student expectations of a class and the realities of research group. In the second group, a few participants talked about the group as a "class." However, when asked about how the experience compared to a class in the interviews, the students all said that they were similar but different. The crucial difference being for some the participation and the roles taken on by the faculty lead; for others it was the production of artifacts that were owned by the group and not just an individual paper. The major point of similarity was the work load for many.

The significance of the role that negotiation can play in balancing production and learning goals extends beyond formal educational contexts. Such tensions are evidenced in many situated learning tasks in which novices and experts interact on production-oriented tasks. Similarly, the creation of regulatory and epistemic tools should be useful in such contexts, and is perhaps inevitable.

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**Appendix A: Interview Documents Submitted to University of Washington,  
Human  
Subjects Division**

- Attachment 1. Email Recruitment**
- Attachment 2. Consent Form**
- Attachment 3. Interview Protocol**

## Attachment 1. Email Recruitment

*Text of recruitment email to be sent to participants in the Spring 2006 and Autumn 2008 offerings of TC 496/596*

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**Subject:** TC 496/596 – Research Study

Dear [Participant Name],

I am conducting a research study on the preprofessional impacts of for-credit directed research groups offered by the HCD&E department. Specifically, I am looking at the two offerings of TC 496/596, during Spring 2007 and Autumn 2008, with [the faculty lead] that analyzed data from the Study of Engineering Educator Decisionmaking (SEED). My study will include two phases: 1) a retrospective analysis of the documents and other work products produced by the two groups and 2) interviews with research group participants about their experience.

I would like to invite you to participate in my study. There are two ways to do this: 1) provide your permission to include some or all of the materials you produced while participating in the research group in the analysis and 2) participate in an interview conducted by me about your experience. You are welcome to do either or both. Your participation will help me better understand how a curriculum like TC 496/596 helps students and other participants become better prepared for their professional careers.

Please contact me, Kathleen Gygi, by e-mail at abc@u.washington.edu or by phone at (123) 000-0000 to learn more about this study. I will provide more detail about the research design and, if you are interested in participating, I will set up a 15 minute appointment with you so you can sign the appropriate consent forms. We can also set up interview appointments then.

Please be advised that the confidentiality of any information send by e-mail cannot be guaranteed. I look forward to your response by June 15, 2009.

Regards,

Kathleen Gygi

## Attachment 2. Consent Form

### UNIVERSITY OF WASHINGTON CONSENT FORM

#### Impacts of Directed Research Groups Study

**Investigator:**

Name: Kathleen Gygi

Telephone: (123) 000-0000

E-mail: abc@u.washington.edu

Academic Affiliation: Research Assistant

University of Washington College of Engineering

Human Centered Design & Engineering

*Please note, the confidentiality of information sent by e-mail cannot be guaranteed.*

#### **Researchers' statement**

You are being asked to be in a research study. The purpose of this consent form is to give you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research, what you will be asked to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When all your questions have been answered, you can decide if you want to be in the study or not. This process is called "informed consent." You will be given a copy of this form for your records.

#### **PURPOSE OF THE STUDY**

This study investigates the impacts of for-credit directed research groups offered by the Human Centered Design & Engineering (HCD&E) department. It focuses on the two iterations of TC 496/596 "Directed Research in Technical Communication" offered by [the faculty lead] during Spring 2007 and Autumn 2008, which analyzed data from the Study of Engineering Educator Decision making (SEED). Understanding your experience will help the department improve such research groups.

#### **STUDY PROCEDURES**

You are being asked to participate in an interview about your experience in an HCD&E directed research group. The interview will last approximately 1 hour. You will be asked broad questions about your academic and professional background, experience with research in general, and your experience of specific activities in the directed research group. For example: "What are you studying?" "What is your current job?" "How did you choose this research group?" You also will be shown selected artifacts produced by the research group and asked general questions about how they were produced and used.

The interview will be audio taped in order to have an accurate record. Please indicate below whether or not you give your permission to be audio taped. You may also be contacted for a ½ hour follow up interview, which you are free to decline. In that case, you will be contacted via email and asked to meet with the principal investigator at a time convenient for you. Please indicate below whether or not you give your permission to be contacted for a follow up interview.

#### **RISKS, STRESS, OR DISCOMFORT**

Some people feel that taking part in research is an invasion of privacy. Some people may feel self-conscious when they are audio taped or when their activities are analyzed for research. Your privacy will be protected as described in the "Other Information" section below.

## BENEFITS OF THE STUDY

There are no direct benefits to you from participating in the study. However, this study will help the HCD&E department improve future research groups.

## OTHER INFORMATION

Participation in this study is voluntary. You may refuse to participate and you are free to withdraw from this study at any time. You may decline to answer any question during the interview and may decide to terminate the interview at any time. You will not be paid for your participation in this study.

All information about you is confidential. You will be assigned a study code and all references to you in the study data will be replaced with the study code; only the principal investigator will know the identities of the participants. If the results of this study are published or presented, your name will not be used. The link between your name and the study code will be kept in a separate, secured location until 3 years after data collection, at which time it will be destroyed. All data collected will be stored in a locked room or on a secure server.

Upon request, you will be given an opportunity to review the audio recordings and delete any portions. Audio taped recordings will be kept for 10 years after study completion, after which time they will be destroyed.

Government or university staff sometimes review studies such as this one to make sure they are being done safely and legally. If a review of this study takes place, your records may be examined. The reviewers will protect your privacy. The study records will not be used to put you at legal risk of harm.”

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Printed name of study staff obtaining consent	Signature	Date
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### Subject's statement

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, I can ask one of the researchers listed above. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098. I will receive a copy of this consent form.

I give my permission to audio tape my interview

I do NOT give my permission to audio tape my interview

I give my permission to be contacted for a follow up interview

I do NOT give my permission to be contacted for a follow up interview

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Printed name of subject	Signature of subject	Date
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Copies to:    Researcher  
                  Subject

### Attachment 3. Interview Protocol

#### UNIVERSITY OF WASHINGTON, INTERVIEW PROTOCOL Impacts of Directed Research Groups Study

**Note: Bulleted/italicized questions asked when appropriate; boxed questions are for PI, professional and instructional staff**

#### I. Grand Tour Questions for Research Groups

##### A. General Overview

1. Tell me about your background...
  - *What are you studying?*
  - *Why did you choose this major/field?*
  - *What is your current job?*
  - *Do you have other relevant professional experience?*
2. I am interested in your understanding of research....
  - *What is research?*
  - *Why did you choose this research group?*
  - *How long have you been (were you) involved with the SEED study?*
  - *What was it about?*
  - *What was your role?*

3. For PI, professional, and instructional staff:

What were your goals for the research group(s)? Instructional? Research?

3. What are your general memories of the research group?
  - *Tell me about the experience...*
  - *What are the major takeaways?*
  - *How is this experience relevant to your career plans?*

4. For PI, professional, and instructional staff:

Your mentioned x as a goal—how was this achieved?

**B. Specific/Task-Related Tour Questions for Three Collaborative Activities (coding, use of online tools, article writing)[Show two key artifacts for each activity, then ask the following questions]**

1. Now, let's look at these documents.... (or one document at a time)
  - *What was the purpose of .....?*
  - *Who worked on it/them?*
  - *Who decided to produce it/them?*
  - *How did you get from doc x to doc y?*
  - *How did you use it/them?*
  - *What was your biggest challenge?*

- *Can you give me an example of how you worked together?*

**C. Mini Tour Questions (use in follow up interview)**

1. Tell me about how you used the WIKI/GoPOST/Email [+ relevant previous questions]:
  - *What tools did you use?*
  - *Did you use any other resources to get your work done?*
2. I'm interested in hearing more about x:
  - *Can you pretend that you're training me to do x? How would you use this document/tool?*
  - *Can you give me an example of x????*

**III. General Tour Impacts and Wrap up**

**A. Impacts**

1. Based on this experience.....
  - *How have you used these ideas?*
  - *How do you think you will use these (or other) ideas in the professional world?*
2. Can you describe how a shared practice developed in the group?
  - *Tell me about your biggest success?*
  - *Can you give me an example of how you worked together?*
  - *Describe the core activities of a researcher...*
  -

3. For PI, professional, and instructional staff:

How were your instructional/research goals achieved?

**B. Research Groups Compared (for participants in both groups, or follow up interviews)**

1. Describe the major differences between the two research groups...
2. In what ways were specific activities different (e.g., coding or use of online tools)?

3. For PI, professional, and instructional staff:

What would you change in future groups?

**C. Wrap up**

1. Before we conclude, do you have any questions for me?
2. May I contact you for a ½ hour follow up interview?

**References**

Mary Kay Gee and Charlotte Ullman. 1998. *Teacher/Ethnographer in the Workplace: Approaches to Staff Development*. ERIC article ED423721. Accessed online thru Google Scholar on 5/13/09.

Michael Quinn Patton. 2002. *Qualitative research and evaluation methods*. Newbury Park, CA: Sage.

# KATHLEEN GYGI

## CURRICULUM VITAE

### EDUCATION

Doctor of Philosophy, Human Centered Design & Engineering, University of Washington, Seattle, WA, 3/11; candidate 3/08

Dissertation title: *"Getting on the same page": Negotiation and intellectual collaboration in a student research group.* Co-chairs: Jennifer Turns and Mark Zachry

Master of Science, Technical Communication, University of Washington, Seattle, 8/07

Master of Professional Studies, Interactive Telecommunications, New York University, 10/87

Bachelor of Arts, Government, Radcliffe College, 6/79

Other graduate studies and certification:

- Professional certification in distance education management and pedagogy, mediation, and quality management
- Community and Regional Planning, University of New Mexico, 1994-1996
- Educational Communication and Technology Doctoral Program, New York University, 1987-1988

### ACADEMIC WORK HISTORY

University of Washington, Human Centered Design & Engineering/Technical Communication, Seattle, WA, 2004-present. Pre-Doctoral Research and Teaching Associate. Conduct data collection, analysis, and dissemination activities associated with externally funded research projects, including:

- Promoting Lifelong Learning, Integrated Knowledge, and Professional Identity in Undergraduate Engineering Students Through a Portfolio Development Process, NSF #IEECI-0835836
- Study of Engineering Educator Decisionmaking, NSF #ESI-0227558
- The Effect of the Internet on Society in Central Asia, NSF #0326101

Santa Fe Community College, Santa Fe, NM, 2001-2004

- College/Career Access Coordinator
- Professional Development Coordinator, New Mexico Small Business Development Center

Northern New Mexico Community College, Española, NM, 1996-2000

- Distance Education Department Director
- Rural Community College Initiative Director

### OTHER PROFESSIONAL EXPERIENCE

Consultant Training and Communication Services, New Mexico and Oregon, 1998-2004

- Clients: Battelle Pacific Northwest Laboratory, CH2M HILL, City of Portland, Dekker/Perich & Associates, Linfield College, New Mexico Legislative Council Services, Northern New Mexico Community College, Northwest Regional Educational Laboratory, Oregon Community College Telecommunications Consortium, Oregon ED-NET, and Portland State University
- Products: customized workshop design and delivery; consulting on telecommunications applications and infrastructure; grant and business proposals, legislative funding requests, white papers, research reports, technology summaries, policies and procedures, and engineering scoping documents

## **TEACHING EXPERIENCE**

Workshops, University of Washington:

- E-Portfolio workshops for engineering majors and co-op participants, Winter and Spring 2010
- Graduate teaching portfolio short workshops, 2006 Annual Teaching Assistant Conference
- Engineering teaching portfolio program workshop (peer facilitator), Fall 2005
- Technical Communication Department doctoral reading seminar (peer facilitator), Spring 2004

Courses, University of Washington:

- Directed Research (assisted), Fall 2008
- Advanced Technical Communication and Oral Presentation, Summer 2007
- Introduction to Technical Writing, Fall 2006, Winter 2007
- Technology and Society (assisted), Fall 2005

Other Courses Assisted:

- Writing the Research Paper (online course), Winter 1993, Linfield College Education Program/Extension
- Cognition and Computer Learning, Winter 1988; Introduction to Mediated Instruction, Fall 1987; New York University

Curriculum Development:

- Communication workshop for software engineers in China, University of Washington, 2008
- Small business advisor training modules, Santa Fe Community College, 2001-2003
- Distance education pedagogy and technology workshops, Northern New Mexico College, 1998-2000

## **EXTERNAL FUNDING FOR EDUCATION AND OUTREACH**

Developed successful proposals for over \$3 million for academic and community-based programs:

- Funding sources included American Association of Community Colleges, Ford Foundation, New Mexico State Legislature, and US Departments of Agriculture, Commerce, Housing and Urban Development, the Ford Foundation

- Partnership resources included loaned faculty and technical advisors, equipment and infrastructure, and professional development opportunities for faculty, staff, and students

Project director:

- Rural Community College Initiative, Ford Foundation demonstration rural poverty alleviation project
- Working Connections, regional information technology workforce development, funded by American Association of Community Colleges and Microsoft Corporation

## ACADEMIC AWARDS

Departmental Nominee, Human Centered Design & Engineering, College of Engineering  
Community of Innovators Award (research assistant category), University of Washington,  
2009

Doctoral Consortium Invited Participant and Presenter, Computer Supported Cooperative Work  
Conference, San Diego, CA, 2008

Technical Communication Department travel grants, University of Washington, 2005-2009

## REFEREED PUBLICATIONS AND PRESENTATIONS

Gygi, K., and Zachry, M. Productive Tensions and the Regulatory Work of Genres in the  
Development of an Engineering Communication Workshop in a Transnational Corporation.  
Article to appear in *Journal of Business and Technical Communication*, July 2010.

Gygi, K. *A Case of Culturability: Designing a Workshop for Chinese Software Engineers*. Poster at  
2009 Association of Teachers of Technical Writing National Meeting, San Francisco, CA

Sattler, B., Turns, J., and Gygi, K. How Do Engineering Educators Take Student Difference into  
Account? Paper in *Proceedings 2009 ASEE/IEEE Frontiers in Education Conference, San Antonio,  
TX*.

Turns, J., Gygi, K, and Prince, M. Working Toward Effective Teaching Practices: A Framework and  
Its Application in the Area of Student Motivation. Paper in *Proceedings 2009 Research in  
Engineering Education Symposium, Queensland, Australia*.

Gygi, K. Community-Based Research Partnerships: An Investigation of Knowledge Portals as Sites  
for Collaboration. Poster and presentation; abstract in *Proceedings 2008 Computer Supported  
Cooperative Work Conference, San Diego, CA*.

Gygi, K.F. and J.H. Spyridakis. Developing a Cultural Model to Support Web Site Localization: A  
Case Study of Uzbek School Web Sites. Paper in *Proceedings Society for Technical  
Communication 52nd (2007) Annual Conference, Minneapolis, MN, 138-142*.

Gygi, K. Peer-Learning and Professional Development at UWTC: From Self-Presentation to  
Communities of Practice. Paper in *Proceedings 2006 Conference of Council of Programs in  
Scientific and Technical Communication, San Francisco, CA*.

Gygi, K., and Rose, E. *Learner-Centered Design: Developing a Participatory Approach*. Workshop at 2006 International Participatory Design Conference, Trento, Italy.

Turns, J., J. Yellin, Y. Huang, and K. Gygi. What's So Important About Peer Review of Teaching Portfolio Components? An Exploratory Analysis of Peer Review Episodes. Paper in *Proceedings 2006 American Society for Engineering Education Conference*, Chicago, IL, June 2006.

Gygi, K. Passing the First PhD Milestone: Choosing a Preliminary Examination Topic. Paper in *Proceedings 2005 Conference of Council of Programs in Scientific and Technical Communication*, Lubbock, TX.

Gygi, K., C. Wei, and B. Kolko. *A Case Study of Digitally Emergent Society: Information Technology and Educational Practice in Uzbekistan*. Paper at 2005 Conference of Central Eurasian Studies Society, Boston, MA.

#### **OTHER POSTERS AND PRESENTATIONS**

Gygi, K. *What do we think we are preparing students for when we talk about professional socialization? What do they think?* Poster at UW Scholarship of Teaching and Learning Symposium, Seattle, WA, April 2010.

Gygi, K. *A Case of Culturability: Designing a Workshop for Chinese Software Engineers*. Poster at UW Scholarship of Teaching and Learning Symposium, Seattle, WA, April 2008. Also at UW Graduate Student Global Research Symposium, Seattle, WA, February 2008.

Turns et al. (includes K. Gygi). *Teaching decisions: What do engineering educators say?* Poster at American Society of Engineering Education, Pacific Northwest Chapter Annual Meeting, April 2007, Pullman, WA.

Kolko, B., et al. (includes K. Gygi). *Information and Communication Technology in Emerging Markets: Central Asia*. Poster at Puget Sound Chapter Society for Technical Communication Showcase, Seattle, WA, April 2006.

Kolko, B., et al. (includes K. Gygi). *Patterns of Technology Use in Central Asia*. Poster at Puget Sound Chapter Society for Technical Communication Showcase, Seattle, WA, April 2005.

Ramey, J., et al. (includes K. Gygi). *Qualitative Data Analysis: Knitting Themes from Large Data Sets*. Poster at Puget Sound Chapter Society for Technical Communication Showcase, Seattle, WA, April 2005.

#### **ACADEMIC SERVICE**

Student volunteer, International Community Partnership Institute, Portland State University, 2009

Student volunteer, Conference of ACM Special Interest Group on Design of Communication, University of Texas-EI Paso, 2008

Student participant, faculty candidate campus visits, UW Technical Communication, 2007 and 2008

Participant, 10-year department review site visit activities, UW Technical Communication, 2006

Academic advisor selection committee member, UW Technical Communication, 2006

External advisory board member, Santa Fe Community College Media Arts Program, 1999-2003

External advisory committee (staff support), New Mexico Small Business Professional Development Program, 2001-2003

Distance learning program committee (chairperson), Northern New Mexico Community College, 1996-2000

Advisory board member, Portland Community College Literacy and Adult Basic Education, 1993-1994

### **PROFESSIONAL AFFILIATIONS AND COMMUNITY SERVICE**

Member American Society for Engineering Education, Council for Programs in Scientific and Technical Communication, and Society for Technical Communication

Co-founder Santa Fe Area Training & Professional Development Group

Peer reviewed civic networking grant proposals for federal Technology Opportunities Program

Literacy volunteer in New Mexico and Oregon; award-winning Big Brothers/Big Sisters mentor