# Becoming a Researcher: A Qualitative Study of the Apprenticeship Model in Doctoral Education

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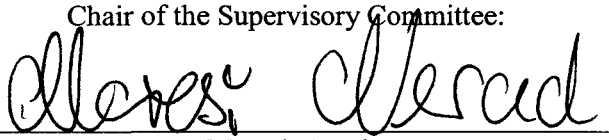

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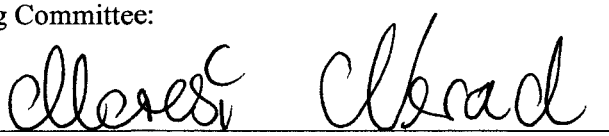

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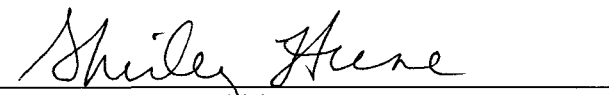

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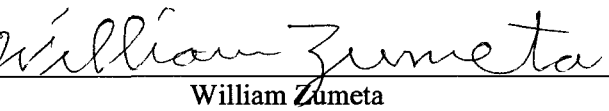

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## DEDICATION

*Dedicated to my son, Alejandro Flores-Scott.*

## ACKNOWLEDGEMENTS

Although this was an independent project, this was not an independent journey. I first want to thank my advisor and chair, Maresi Nerad, for guiding and supporting my development as a scholar. She not only fostered my learning in the classroom and through one-on-one interactions, but she also provided me with a variety of opportunities that significantly shaped and impacted my studies. I traveled the world because of Maresi, and I am forever grateful to her.

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**ABSTRACT**

Becoming a Researcher: A Qualitative Study of the Apprenticeship Model in Doctoral Education

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Despite the growing body of research on doctoral education, little is known about how doctoral students learn to do research across the disciplines. Even though there is a lack of empirical research on the pedagogy of research in doctoral education, much of the literature anecdotally and metaphorically attributes students' learning to traditional apprenticeship relationships between a student and an advisor. The purpose of this qualitative study is to examine how doctoral students learn to do research and to what extent, if any, do apprenticeship relationships facilitate students' learning. A conceptual framework of the apprenticeship model in doctoral education based on literature from doctoral education, adult learning, labor research, schooling, and professional education was designed. Primary data was collected through semi-structured interviews with 10 faculty members and 21 doctoral candidates from three disparate academic departments (bioengineering, comparative literature, and sociology) at one research university. Findings showed that other apprenticeship relationships exist in doctoral education that go far beyond the traditional or classical definition between one master and one novice. Instead, doctoral students in this study were engaging in apprenticeships with multiple individuals (other

faculty members, post-docs, and more advanced peers). These apprenticeship relationships focused on a broad range of topics and they varied in duration. Moreover, faculty and students in the different disciplines demonstrated different understandings of learning to do research. Results from this study call for the need to re-conceptualize the apprenticeship model in doctoral education in order to better reflect the realities of how doctoral students are learning to do research in their field. A revised model will not only help to increase the transparency around the pedagogy of research, but also help doctoral students to become aware of what it takes to become an independent researcher.

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- *Getting a Ph.D. has been a lot about shedding one identity and gaining another... at least on the outside. It is a lot of posing, of learning a language, and adopting a personality that fits within the culture of my field.*
- *I am becoming a researcher, a scholar, someone with expertise. I am someone who is learning a culture, a language, the behavior, and am able to pass for one of them. It is both real and an act, although I may not notice as much anymore, almost four years into it.*
- *If you can have the opportunity to research something deeply and fully and actually complete all of the steps in the research cycle, then, if you have the will and desire to do it again, you can research just about anything.*

The previous quotes are from my own personal journals throughout my six years as a doctoral student. They provide a snapshot of my own learning process and transition towards becoming an independent researcher. There is no denying that my own experiences and observations as a doctoral student informed and shaped this study. As I have asked students to reflect on how they became researchers in their fields, I have had to reflect on my own experiences as well. I ultimately attribute my development as a researcher to the following: multiple apprenticeship relationships, interdisciplinary learning experiences, international research collaborations, and several research assistantships. These activities gave me the opportunity to observe others, to collaborate with others, and to feel supported and encouraged. Who I have become as a researcher is now captured in this dissertation, and I hope that it will be the first of many contributions to the scholarship and practice of doctoral education.

# CHAPTER 1

## INTRODUCTION

Since the awarding of the first Ph.D. at Yale in 1861, doctoral education in the United States is currently viewed as the pinnacle of higher education and an exemplar to other countries around the world. Over the past several decades, research on doctoral education has increased significantly around topics such as: degree completion, attrition, time to degree, the socialization process, advising and mentoring, career paths, and student diversity. Much of this research has been driven by a variety of reoccurring challenges and criticisms regarding doctoral education. Table 1 identifies some of the key areas of concern that researchers have focused on during the last several decades.

Table 1

*Key Areas of Concern in Doctoral Education*

| Key issue | Literature |
|---|---|
| On average, attrition from doctoral education is 50% across all disciplines and time to degree has increased by one year in all fields. | Bowen & Rudenstine, 1992; Ehrenberg et al., 2010; Golde 1998; Lovitts, 2001; Nerad, 1991; Nerad & Cerny, 1993 |
| Graduate students are not prepared for the full range of faculty responsibilities: research, teaching and outreach/service. | Austin, 2002; Nerad, 2004; Nyquist, 2002; Wulff & Austin, 2004 |
| Graduate students are not acquiring a wide range of professional skills (e.g., the ability to work in teams, and managerial skills), and are being trained too narrowly. | Committee on Science Engineering and Public Policy, 1995; Council of Graduate Schools, 2007; Nyquist & Woodford, 2000 |
| The quality of advising and mentoring is inconsistent throughout doctoral education | Association of American Universities, 1998; Fagen & Wells, 2004; Nerad, 1995 |
| There continues to be a lack of diversity among doctoral students and the professoriate | Cole & Barber, 2003; Ibarra, 2001; Nyquist & Woodford, 2000; Vining Brown, 2000 |

The increased attention around these and other issues has resulted in a need for more effective assessments of the quality of doctoral programs, increased accountability in doctoral education (Maki & Borkowski 2006; Ostriker, Kuh & Voytuk 2003), and more information on outcome studies and career path studies (see for example Nerad & Cerny, 1999).

**1.1 What is missing from the literature?**

The fundamental purpose of doctoral education is to prepare students to do research (Council of Graduate Schools, 1990). As such, the Ph.D. has traditionally represented expertise in a discipline or field as well as the ability to generate new knowledge through original, independent, research. In the previous illustration of key issues and research in doctoral education, noticeably absent are any studies focused on the theory and practice of how students are taught to do research (Turner, Miller & Mitchell-Kernan, 2002; Walker, Golde, Bueschel & Hutchings, 2008), or what Golde (2007) refers to as the "pedagogy of research." It is surprising that we have such little empirical understanding of the primary function of doctoral education. Interestingly, countries like Australia, the United Kingdom, and Canada have recently developed a number of studies and publications on this topic (Green & Lee, 1995; Delamont, Atkinson, & Parry, 2000; Pearson & Brew, 2002; Manathunga, 2005). While we have much to learn from this research, the unique structure and culture of doctoral education in the U.S. necessitate that we generate our own research around how doctoral students learn to do research.

Expanding our empirical understanding of the pedagogy of research in doctoral education will be beneficial to doctoral educators and their everyday practices. At the same time, it is also likely to shed some light on many of the key issues mentioned above (e.g., time to degree, quality of advising and mentoring). For example, it has been well-documented over time, that

across all disciplines, 50% of doctoral students that start Ph.D. programs do not complete them (Berelson, 1960; Bowen & Rudenstine, 1992; National Research Council, 1996; Nerad & Cerny, 1993; Nettles & Millett, 2006). These high rates of attrition are not only costly to students, but also to departments and universities, from which students leave (Lovitts, 2001). Lovitts (2001), in her seminal study on attrition, showed that the consistency of the 50% attrition rate could not be attributed to individual characteristics or extenuating personal circumstances. Instead, she demonstrated that high attrition was reflective of a greater systemic problem with the organizational culture, structure, and processes of graduate education. As mentioned above, there is little empirical research on these structures and processes and this study will help expand our understanding of how doctoral students learn to do research. This in turn will help to increase the transparency and communication around the processes of doctoral education, as was recommended by Lovitts (2001).

**1.2 Statement of problem**

Even though we lack an empirical understanding of the pedagogy of research in doctoral education, much of the literature on doctoral education anecdotally and metaphorically attributes research learning to traditional apprenticeship relationships between an expert (advisor), and a novice (student) (see Page, 2001 and Golde, 2008). For example, researchers from The *Carnegie Initiative on the Doctorate*, a five year action and research project on restructuring doctoral education, identified the apprenticeship model as the "signature pedagogy" (Shulman, 2005) of doctoral education (Walker, Golde, Jones, Bueschel & Hutchings, 2008). They suggested that "One of the sturdiest and most distinctive features of doctoral education is that so much of the important teaching and learning takes place in a one-to-one apprenticeship between student and faculty member" (p. 89).

Although the apprenticeship model is commonly used to describe how doctoral students learn to do research, there is no empirical research on what this looks like across different departments, disciplines, and universities. In this study, I argue for the need to expand the apprenticeship model so that it goes beyond the one-on-one dynamic between a student and an advisor, in order to recognize that students learn from multiple individuals throughout the Ph.D. experience.

**1.3 Research questions**

The purpose of this study is to examine how doctoral students learn to do research. To address this question, the following sub-questions were generated:

1. What are the main requirements in a doctoral program and what do students learn from them (formal requirements)?
2. What additional activities and experiences help students learn to do research (informal activities)?
3. Does an apprenticeship model exist across all doctoral programs? And if so, what do they look like?
    a. Who are the facilitators of apprenticeship relationships?
    b. Are there different types of apprenticeships?
    c. Is there evidence of cognitive apprenticeship tools being used?

In order to answer these questions, a qualitative study was designed to look at three different academic departments at one Research University. Three distinct disciplinary areas and departments were selected to capture the differences around the beliefs that faculty have about how knowledge is best transmitted and produced. The primary data source for this study was

drawn from semi-structured interviews with faculty members and doctoral candidates from each academic department.

**1.4 Organization of the dissertation**

In the introduction, I provide an overview of this study's background, statement of problem, research questions and the organization of the dissertation. In the second chapter I review the relevant literature to discuss the beginnings of doctoral education in the U.S., and to highlight the dominant research paradigm used by researchers of doctoral education in the U.S. Next, I illustrate the prevalent use of the apprenticeship model through anecdotal evidence, and discuss both the negative and positive aspects around its use. Drawing from the literature, I discuss the conceptual framework of the pedagogy of research in doctoral education and the apprenticeship model developed for this study.

In chapter three, I describe the research methodology used in the study as well as the methods of data collection, site selection, selection of the disciplines and departments, selection of the participants, data analysis, the techniques undertaken to meet the criteria of trustworthiness, and any limitations.

Chapter's four to six summarize the major findings of this study through a detailed description of how doctoral students in each of the three academic departments learned how to do research. This includes interview data from both faculty and doctoral candidates on the skills needed to do research in their field and an examination of the role of formal requirements and informal activities on students' development as researchers. Each chapter ends with a discussion of the apprenticeship model illustrated in each department.

Chapter seven features a cross-analysis of the findings from the three academic departments and a discussion of how collectively these expand our understanding of the

apprenticeship model in doctoral education. Then, I revisit the conceptual framework and identify its strengths as well as propose some revisions in response to participants' experiences.

Finally, in chapter eight I summarize the key findings from this study and offer practical recommendations to three major stakeholders of doctoral education: faculty members, doctoral students, and graduate schools. Comments on directions for future research conclude the dissertation.

### 1.5 Summary

Every day doctoral students engage in a system designed to prepare them to become the next generation of researchers and scholars. As such, it is troubling that we have such a limited empirical understanding of the process of teaching or pedagogy of research in doctoral education. This research is a necessary first step towards expanding our understanding of apprenticeship relationships which will help contribute to the development of a general model of apprenticeship learning in doctoral education.

# CHAPTER 2

# REVIEW OF THE LITERATURE AND CONCEPTUAL FRAMEWORK

## 2.1 The beginning of doctoral education

The formation of doctoral education in the United States was greatly influenced by the German university model of *Wissenschaft.* Throughout the 19th century, approximately 10,000 Americans went to Germany for graduate study (Berelson, 1960). During that time, American colleges were modeled after English liberal arts colleges and their primary function was to discipline youth through a prescribed curriculum of "rote learning of classical languages, rhetoric, and simple mathematics" (Turner & Bernard, 2000, p. 221). For students interested in advanced study their only option at that time was to study abroad.

Many of those who received their Ph.D.s outside of the U.S. returned and became college professors. These professors became advocates for the creation of universities similar to the ones they had attended. In 1861 three students received a Doctor of Philosophy from Yale's Sheffield Scientific School (Geiger, 1993). In order to receive this degree, these students had to complete two years of study, pass an exam, and submit a written dissertation (Storr, 1973). Shortly thereafter, doctorates were awarded at The University of Pennsylvania and at Harvard.

However, it was the opening of The Johns Hopkins University in 1876 which signified for many the beginning of graduate education in the U.S. Johns Hopkins became a prototype for other institutions as a place where advanced learning and research were prioritized as a major university function (Gumport, 1993). While Johns Hopkins was founded for the purpose of graduate education and research, in actuality, it was unable to disassociate from the undergraduate college due to a lack of funding for graduate education alone. While Johns Hopkins created a graduate school that administered to the needs of graduate students, it also

became inextricably linked to undergraduate education through its faculty and the creation of academic departments (Geiger, 1993). The organizational structure of academic departments made graduate instruction arguably flexible and decentralized and it organized undergraduate instruction around disciplines (Gumport, 1993). While the German university served as an initial model for graduate education in the U.S., what emerged was a unique combination of the English liberal arts college model with the German university model, a legacy that remains today.

In 1900, a select group of 14 institutions considered to be "at the top of a hierarchy of prestige on the basis of their engagement in graduate education and research" (Gumport, 1993, p. 230), joined to create the Association of American Universities (AAU). The purpose of this association, and its initial conference, was to establish uniformity across the doctorate, to improve the reputation of U.S. graduate education abroad, and to help raise the standards of weaker institutions. Gumport (1993) described the AAU as an exclusive club for institutions that had the most concentrated fiscal and status resources.

The AAU's focus on standards, the establishment of the Ph.D. as professional training for the professoriate, and the creation of the Graduate Record Examination to improve the standard of graduate admissions at the end of the 1930s, turned graduate education into a competitive enterprise (Geiger, 1993). However, all of this was turned on its head at the end of World War II, which brought about significant change in U.S. higher education. One catalyst for change was the GI Bill which helped to double the number of Ph.D.s conferred. Another factor was the significant financial investments in wartime research, which were increased and secured after the launching of Sputnik in 1957 (Geiger, 1993). A third factor was that American society became committed to the advancement of knowledge through research, which further contributed to the growth and wealth of universities.

While the pursuit of research was costly, it was viewed as rewarding for the country (Geiger, 1993) particularly in its training of manpower (Gumport, 1993) and for its contributions to national security (Berelson, 1960). This led to significant growth from 1950 to 1970 in the number of institutions that awarded Ph.D.s, the number of degrees conferred, the number of fields offering doctorates, and in the number of women and foreign doctoral students. Under-represented minorities also made gains during this time, albeit much more slowly (LaPidus, 2001).

Despite economic fluctuations and a loosening labor market, graduate education has continued to grow and evolve. The most recent data on earned doctorates shows that in 2009, over 49,000 doctorates were awarded by 420 U.S. colleges and universities. Of the total number of degrees, 47% were awarded to women, and 13% were awarded to U.S. racial/ethnic minority group members (National Science Foundation, Division of Science Resources Statistics, 2010).

While the enterprise of doctoral education has grown over time, "the distinctive American model for doctoral education has remained the same" (Gumport, 1993, p. 239). However, we know very little about how doctoral students learn how to do research across different disciplines.

**2.2 Organizational socialization**

Much of what we do know about doctoral education has been broadly described through the lens of organizational socialization. Socialization is broadly defined as the process by which people learn the values, skills, and norms of a particular culture or society (Merton, 1957) and organizational socialization focuses on how an individual becomes part of an organization (Van Maanen, 1976). Organizational socialization continues to be the dominant research paradigm in U.S. (Austin, 2002; Baird, 1990; Bragg, 1976) and a significant body of research has been

produced on the socialization experiences of doctoral students (Antony, 2002; Austin, 2002; Gardner, 2008a, 2008b; Golde, 1998; Gonzalez, 2006; Lovitts, 2001; Tinto, 1993; Turner & Thompson, 1993; Weidman & Stein, 2003).

The following description of socialization in doctoral education comes from Turner, Miller and Mitchel-Kernan's (2002) study of doctoral education's disciplinary cultures:

> A fundamental part of graduate education is socialization—the elders teach the young what they should know, what they should value, how they should behave, and how to do the work associated with their particular discipline. Like other domains of socialization, graduate education has formal components as well as tacit aspects of training which involve acquisition of beliefs and behavioral norms through observational learning, social comparison with peers and elders, and general immersion and participation in the routine activities of everyday interaction. (p. 57)

Chris Golde (1998) adds that doctoral students experience a double socialization. In other words, they are socialized into their profession and into the role of doctoral student. Various researchers have shown that successful socialization often leads to degree progress (Turner & Thompson, 1993), while unsuccessful socialization can cause departure from a program (Lovitts, 2001; Tinto, 1993).

In an effort to describe the socialization process in doctoral education, several researchers have identified stages of doctoral student development (Bowen & Rudenstine, 1992; Tierney & Bensimon, 1996; Weidman, Twale & Stein, 2001) and frameworks to illustrate the overall socialization process of doctoral education (Bragg, 1976; Weidman et al., 2001). One of the more commonly used graduate student socialization frameworks comes from Weidman et al. (2001) and is based on the work of Thornton and Nardi (1975). Weidman et al. identified four

stages of socialization: *anticipatory* (preparatory and recruitment phases), *formal* (novice receives formal instruction), *informal* (novice learns informal role expectations), and *personal* (formation of a professional identity). Students are believed to begin moving through these stages during graduate school, although they may not complete them until they are already in their profession. In this model, role acquisition and identity formation are the key outcomes of socialization and are acquired by three means: (1) acquisition of the knowledge necessary for the role, (2) being personally invested and committed to the role, and (3) actively participating and being involved in some aspect of the professional role.

*2.2.1 Critique of the socialization process in doctoral education*

Despite the prevalence of the theory of socialization in doctoral education research, several researchers have been critical of its application. Tierney (1997) argued that the theory of socialization gave a static view of the organizational culture of doctoral education and left little room for multiple perspectives. In turn it produced *winners and losers* or *misfits and fully incorporated members* as determined by how well a student assimilated to the social norms of the discipline or field (Antony, 2002).

Another criticism of the socialization theory in doctoral education is that it represented student development as a linear process (Tierney, 1997; Turner & Thompson, 1993) implying that there was only one way to be socialized (Antony, 2002) and that all students would progress through the model in the same way. Additionally, it was assumed that students should be socialized into the same type of careers as faculty (Antony, 2002). Tierney & Bensimon (1996) further argued that many of the socialization models treated students as passive participants who had little impact on other students, faculty, or even the organization itself. While the idea of socialization possesses a positive connotation of nurturing students into a community through

which they acquire the norms, values, and culture necessary for success in a field, it also implies that students must shed their own identities in order to succeed in the academic culture. Researchers have shown that this is particularly problematic for under-represented doctoral students and faculty (Antony & Taylor, 2001; Gardner, 2008b; Tierney & Bensimon, 1996; Turner & Thompson, 1993).

In response to many of these critiques, a postmodern view of socialization has emerged leading to a reconceptualization of socialization as a two-way and dialectical process (Austin & McDaniels, 2006; Tierney & Bensimon, 1996).

*2.2.2 Usefulness of the theory of socialization to understand doctoral education*

The theory of organizational socialization has significantly contributed to our understanding of doctoral education as socialization to the academic career (Austin, 2002) in several different ways. Several researchers, for example, have identified stages of doctoral student development to illustrate critical transition points in doctoral education (Bowen & Rudenstine, 1992; Lovitts, 2001; Weidman et al., 2001). Additionally, this theory has illustrated the role of disciplinary and institutional contexts and faculty-student relationships on students' development (Austin, 2002).

Interestingly, one area that has not been well researched in doctoral education is what Van Maanen (1976) referred to as one of several modes of socialization, the apprenticeship model. He defined apprenticeships as "Skill-oriented and directed toward imparting the abilities and knowledge necessary for the new member to perform a designated organizational role" (p. 102). Furthermore, he claimed, "The responsibility for transforming the new member to full status is delegated to selected experienced organizational members" (p. 105). Although the apprenticeship model is identified as one mode of socialization there has been an absence of

empirical research on the apprenticeship model in doctoral education. This is particularly puzzling given the prevalence of the apprenticeship model in the discourse of doctoral education.

**2.3 Doctoral education and the apprenticeship model**

Within the literature on doctoral education one area that continues to be unexamined is the everyday practices in doctoral programs. Despite the fact that the key purpose of doctoral education is to produce the next generation of researchers and scholars, we continue to have a limited understanding of the pedagogies that enable such production to occur. We know that doctoral programs are successful in educating at least some of their students given the numbers of graduates each year, and yet we also know that on average 50% of doctoral students don't complete the degree (Bowen & Rudenstine, 1992; Golde 1998; Lovitts, 2001; Nerad & Cerny, 1993). Overall there is a lack of empirical research on the pedagogy of research (Walker et. al., 2008), which refers to the theory and practice of how students are taught to do research (Golde, 2007).

One of the most common ways that students, faculty, and researchers describe the pedagogy of research in doctoral education is as an apprenticeship (Burmester, 2003; Golde, 2008; Ibarra, 2001; Nyquist & Woodford, 2000; Shulman, 2004, Trow, 1977; Walker et. al., 2008). Table 2 provides just a few examples of how apprenticeships and other related language have been used in the context of doctoral education.

Table 2

*Illustration of the Use of the Apprenticeship Model to Describe Learning in Doctoral Education*

| |
|---|
| When students apprentice to a master they learn the formal and informal art of the trade.<br>(Lovitts, 2001, p. 146). |
| The operating model [in doctoral education] is one of apprenticeship. Typically, students work under the tutelage of their advisors, learning the intricacies of research, and becoming increasingly independent scholars.<br>(Golde & Dore, 2001, p. 5) |
| Although we rarely describe it as such, I think the history doctorate retains many aspects of the ancient educational practice known as apprenticeship. Under that system, novices seeking entry into a guild or profession attach themselves to a master to learn the mysteries of a craft.<br>(Cronon, 2006, p. 346) |
| Indeed, graduate education is first and foremost an apprenticeship—an apprenticeship in the art of discovery.<br>(Kwiram, 2006, p. 141) |

More recently, researchers from The *Carnegie Initiative on the Doctorate*, a five-year action and research project on restructuring doctoral education, identified the apprenticeship model as the *signature pedagogy* (Shulman, 2005) of doctoral education (Walker et al., 2008). Walker et al. suggest that, "One of the sturdiest and most distinctive features of doctoral education is that so much of the important teaching and learning takes place in a one-to-one

apprenticeship between student and faculty member" (p. 89). All of these examples serve to illustrate the extent to which the apprenticeship model, and the language associated with it (i.e., master, novice, trade, and guild), has been used to describe the pedagogy of research in doctoral education.

*2.3.1 Critique of apprenticeship model in doctoral education*

Despite its frequent use, there are two major critiques of the apprenticeship model in doctoral education: (1) its traditional reliance on power, and (2) the inconsistency with which it is applied to students. Burmester's 2003 dissertation examined doctoral education in rhetoric and composition. She observed that the apprenticeship model was the primary model of training for graduate students in her field. She criticized the reliance on apprenticeships because they inherently retained a strong power differential, reinforced unidirectional learning, and relied exclusively on being dependent on one master (advisor). She concluded that her field needed to re-evaluate the use of apprenticeships as the primary model of training for graduate students.

In an earlier publication by the Carnegie Initiative on the Doctorate (Golde & Walker, 2006), scholars from six fields reflected on various aspects of doctoral education. Bender, a historian, said this about the education of historians:

> History and other disciplines must address the persistence of a medieval custom in the modern university: the "master" and "apprentice" concept of doctoral education implies a work of replication. The master must reproduce himself or he fails, while an apprentice who fails to assume the form of the master is also a failure—for both teacher and student. This particular teacher-student bond, with all the perverse forms of power and identification it encourages, as well as the sense of failure that it produces, needs to be opened up. (Bender, 2006, p. 305)

The dynamic of *one master* with the goal of replication was also recognized by Walker, et al. (2008) as problematic. Although they described the apprenticeship model as the *signature pedagogy* of doctoral education, they echoed the concerns of Burmester (2003) and Bender (2006) and argued that the power relationship inherent in the apprenticeship model, as practiced in their fields, was not productive.

An additional critique of the apprenticeship model in doctoral education has been the inconsistent access students have to apprenticeship relationships. Golde (2008) writes that apprenticeship learning requires working closely with an advisor to prepare for the multitude of roles that they will need to be able to fulfill upon graduation (i.e., research, teaching, service, management and advising). However, students have varying access to these apprenticeship relationships:

> There is no quality control, no assurance that information is current or correct. Nor can the student be confident of coverage of all aspects of professional practice. And because there is no system for matching masters and apprentices, access to this resource is haphazard. As a result, many students get little formal help, and others do not think to seek it out. (p. 18)

Inconsistent access to faculty support has been an ongoing challenge of doctoral education (Association of American Universities, 1998; Fagen & Wells, 2004). Walker et. al. (2008) observed that students who had high-quality advising and mentoring referred to themselves as "lucky," illustrating the random and haphazard access students have to apprenticeship relationships.

Before we completely throw out the apprenticeship model we need to gather empirical data on whether or not the apprenticeship model even exists. If so, what does it look like? And is it the most effective way to prepare students to become independent researchers?

*2.3.2 Usefulness of the apprenticeship model in doctoral education*

Although there have been various critiques of the apprenticeship model, many believe it should not be totally abandoned. Walker et al. (2008) advocated instead for a redefinition of the apprenticeship model in doctoral education. They suggested that the model should "...be understood more broadly as a theory of learning and a set of practices that are widely relevant...[which]... can and should inform and strengthen all aspects of the doctoral program..." (Walker et al., 2008, p. 91). For example, instead of relying on one master, students should be encouraged to apprentice with several mentors. Bender (2006) similarly suggested, "Although a principal adviser is essential in doctoral education, the culture of the department must encourage more open relationships and sustain a plurality of significant advisers at all stages of graduate education." (p. 305). Walker et al. further argue that a key to doctoral students' success is that all aspects of scholarly and professional expertise must be made visible and explicit. To accomplish this, they recommended that departments assume greater collective responsibility for their students and ensure that mentors and advisors are recognized for their work. Finally, since apprenticeships depend on relationships, these relationships should be cultivated with respect, trust, and reciprocity.

Although the apprenticeship model is a feature of doctoral student socialization and is commonly used to describe how doctoral students learn to do research, we know very little systematically about exactly what the apprenticeship model looks like in doctoral education. Furthermore, we do not have enough information to tell us if learning via the apprenticeship

model is the most effective way to prepare students to become independent researchers. If the apprenticeship model is a "signature pedagogy" of doctoral education, as suggested by Walker et al. (2008), empirical research is needed to better understand where it falls short and could be improved. This is necessary to ensure that all students have consistent and equal access to such a fundamental pedagogical practice. Currently, the majority of the literature on the apprenticeship model is found in research on adult learning theory, labor, professional education, and schooling.

### 2.4 Conceptual framework of the pedagogy of research in doctoral education

In order to address the research questions in this study, I developed a conceptual framework from the literature to illustrate what we currently know about the pedagogy of research in doctoral education (*Figure* 1). In this framework, the doctoral student moves through a developmental process that leads him or her to become an independent researcher. The developmental process is mediated by the academic department (doctoral education learning context), which is shaped and formed by the norms and processes of the discipline, the setting, and its participants. Within that context, a variety of formal requirements and informal activities help facilitate learning. Ultimately, what we know about the pedagogy of research is that it is likely to look very different across different disciplines.

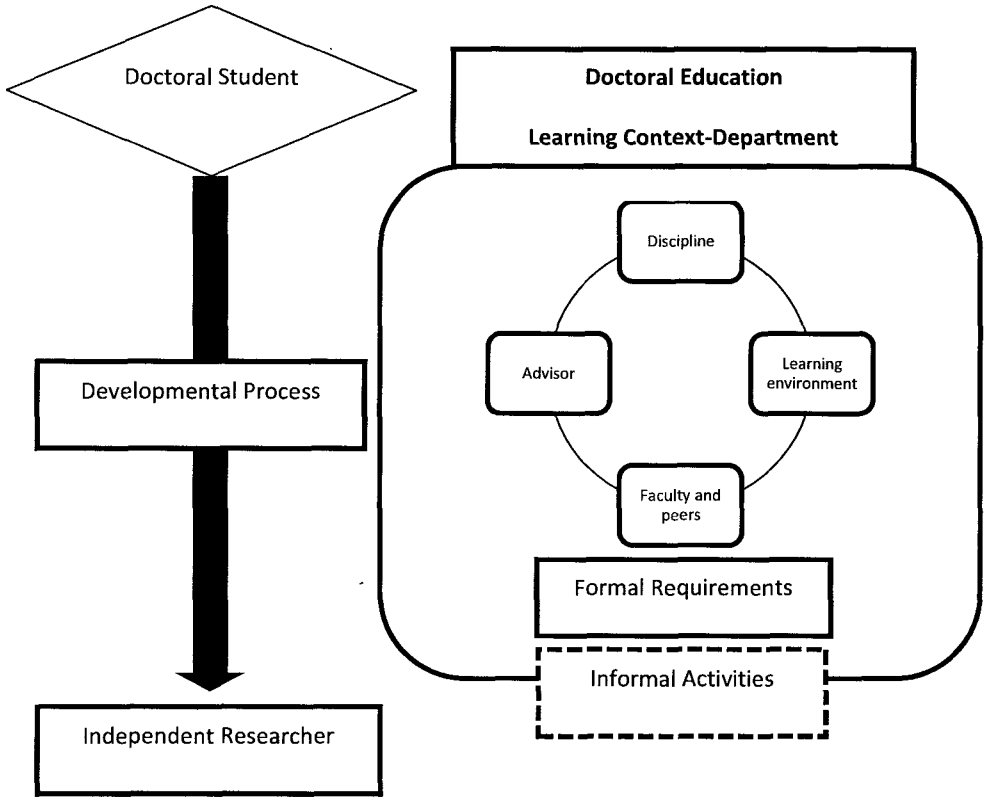


*Figure 1.* Conceptual framework of the pedagogy of research in doctoral education

*2.4.1 Doctoral student*

The doctoral student goes through a developmental process that results in becoming an independent researcher.[1] This is based on other socialization models (see Weidman, 2006) which illustrate how students enter doctoral programs with a set of skills and a general understanding of what is required to graduate. Next they are socialized through experiences that occur primarily within the Ph.D. program resulting in completion of the degree with the skills necessary for doing research in a specific discipline/field of study. I would add that doctoral students increasingly represent a diverse population (i.e., in age, race and ethnicity, sex), who bring a variety of previous (i.e., professional and educational) and current experiences (i.e., enrollment

[1] Note: Although a single arrow is used to represent the developmental process, it is not intended to be viewed as a linear process.

status, familial responsibilities and career goals), which influences their experiences in the program.

One of the best representations of doctoral students' intellectual resources was developed by Lovitts (2005) in a larger theoretical perspective on students' transition to become independent researchers. Drawing on the scholarship of creativity, she identified five personal, psychological, and social resources necessary for creative endeavors. These included: intelligence, knowledge, thinking styles, personality and motivation. Lovitts further demonstrated that these resources interact with and are influenced by factors in the environment of doctoral education. Although the present study does not examine individual students' resources, it acknowledges that students are not "blank slates" (Freire, 1968) and that much of how they move through the stages of development in doctoral education is shaped by the personal, psychological, and social resources identified by Lovitts (2005).

*2.4.2 Developmental process*

As mentioned above, among the valuable pieces that have emerged from the literature on doctoral student socialization are various models of doctoral student development (Bowen & Rudenstine, 1992; Lovitts, 2001; Weidman et al., 2001). In order to understand doctoral students' development, this conceptual framework integrates the stages of development identified by Bowen & Rudenstine (1992).

The first stage that they identify is entry and adjustment. This stage occurs during a student's first year in a program when he/she makes the transition from outsider to insider. At this point students are primarily knowledge consumers. The second stage, development of competence, begins in the second year and ends when the student has advanced to candidacy. At this stage students are demonstrating expertise as knowledge consumers. The final stage, the

research stage, involves the task of identifying an appropriate dissertation research topic and completion of the dissertation. In this stage students are moving towards becoming knowledge producers.

The benefit of these stages is that they identify general transition points and activities in doctoral education, which are common across all departments and fields. In this conceptual framework, these stages of development are used to help identify if there is a particular stage where apprenticeship relationships are more salient or important than others, how apprenticeship relationships might change over time, and whether certain apprenticeship relationships become more important or salient for doctoral students at these different stages.

*2.4.3 Independent researcher*

The fundamental purpose of the Ph.D. is to prepare students to do research (Association of American Universities, 1998; Council of Graduate Schools, 1990) and students work under the guidance of an advisor to learn the intricacies of research in order to become increasingly independent scholars (Golde & Dore, 2001). Although many have argued that doctoral students need to be prepared for a broader range of responsibilities required of scholars (Austin, 2002; Boyer, 1990; Nerad et.al., 2007; Nyquist & Woodford, 2000; Wulff & Austin, 2004), the development of independent researchers remains central to the mission of the Ph.D.

In this conceptual framework, with its focus on the pedagogy of research (the theory and practice of how students are taught to do research) students are believed to move through a series of developmental stages that will result in their becoming independent researchers. In other words, students will have acquired expertise in a particular discipline or field and will be able to generate new knowledge through original research. According to the Council of Graduate School

(1995), the successful completion of the dissertation signifies the transition from student to independent scholar.

*2.4.4 Academic department*

Doctoral education in the U.S. is a largely decentralized system with no national governing body or agency (Guillory, 2000; Jones 2009; Nerad, 2008). In each university, the graduate school provides a level of administrative oversight to the Ph.D., but the primary locus of control rests within academic departments (Berelson, 1960; Bowen & Rudenstine, 1992; Gumport, 1993; Nerad & Miller, 1996). According to Trow (1977):

> The department in most American universities has almost complete autonomy over graduate education in its discipline…the department determines the graduate curriculum and recruits and admits students. It then inducts them into the discipline, transmitting skills and knowledge and shaping and creating values and attitudes regarding what knowledge is and how best to pursue it (p. 15).

As a result, the department provides a very unique learning environment for doctoral students because they differ in culture, socialization processes, requirements, etc. (Lovitts, 2001). Within the doctoral education learning context of the academic department there are several different factors which interact to shape the learning context: (1) the disciplinary culture, 2) the learning environment, (3) the advisor, and (4) other faculty and peers.

*2.4.5 Discipline*

One key influence on the learning context of the academic department is the academic discipline. Various researchers have examined disciplinary differences, characterizing disciplines along dimensions like hard/soft and pure/applied (Becher & Trowler, 2001; Biglan, 1973a, 1973b). For purposes of this study, academic disciplines in higher education are made up of

"attitudes, activities and cognitive styles..., which are bound up with the characteristics and structures of the knowledge domains" (Becher & Trowler, 2001, p. 42). This suggests that academic disciplines are largely recognizable in their identities and they each have unique cultural attributes (Becher & Trowler, 2001), distinct learning environments, knowledge, and pedagogies (Donald, 2002). These identities and cultural attributes are both created and maintained by those affiliated with the discipline (i.e., faculty members, students, and administrators). For example, many lab-based sciences support and encourage collaborative research while the Humanities have traditionally supported independent scholarship. This conceptual framework recognizes the important role that disciplinary values and norms have in shaping the doctoral education learning context and ultimately how doctoral students learn to do research.

*2.4.6 Learning environment*

A second important feature of the learning context of the academic department is the environment and physical space of the department. Within each department there is some unique configuration of physical features that includes classrooms, lounges, offices, laboratories, etc. Researchers have shown that the physical spaces impact the overall development of doctoral students in the interaction and community they foster (Lovitts, 2001; McDaniels, 2006). Lovitts (2001), for example, showed that a student's academic and social integration into a program was impacted by a department's physical space.[2] She found that group offices provided more opportunity for graduate students to interact and develop a sense of community membership.

[2] Academic integration is the primary purpose of graduate education and occurs through, "...task integration, working together on the intellectual and professional tasks of graduate education: learning, teaching, researching, and publishing" (Lovitts, 2001, p. 42). Social integration occurs through socioemotional integration or supportive interactions with members of a departmental community (Lovitts, 2001).

The inclusion of learning environments in this conceptual framework acknowledges the important role that physical space can play in facilitating interactions and promoting community, which ultimately supports doctoral student development.

*2.4.7 Advisor*

There is a substantial body of research on the critical role that advisors have in a student's doctoral education and professional career (Etkowitz, Kemelgor & Uzzi, 2000; Golde & Dore, 2001; Lovitts, 2001, 2004, 2008; Nettles & Millett, 2006). Baird (1995) in fact suggested that the doctoral advisor is one of the most important persons with whom doctoral students will develop a relationship during their doctoral education. Research on attrition has shown that bad advisor-student relationships can have a significant impact on whether doctoral students leave their doctoral programs (Lovitts, 2001; Nerad & Miller, 1996). Lovitts (2004) writes, "This person (the advisor) influences the nature and quality of the students' graduate experience, the students' socialization as a researchers and academic professionals, and the students' subsequent job placement." (p. 122).

The advisor-student relationship has been isolated in this conceptual framework to highlight the importance of this relationship. Additionally, the advisor is seen as a mediator between the doctoral student and the learning context of the academic department.

*2.4.8 Faculty and peers*

Within the conceptual framework, faculty members and peers represent the many individuals that doctoral students will interact with during their studies. In addition to working closely with their faculty advisor, all students will form a dissertation committee made up of other faculty members who will play an important role in guiding and assessing students' dissertations. Students will also interact with other faculty members through their coursework

and through other informal activities in and across academic departments. Research has shown that faculty members play an important role in the socialization of doctoral students (Weidman et al., 2001). Given that knowledge acquisition is a dimension of socialization, this conceptual framework recognizes faculty members as playing a role in students' learning of how to do research.

Peers are also included in the framework, although there is little research on peers directly playing a role in how doctoral students learn to do research. There is, however, a significant amount of research on how informal interactions with peers and the presence of a strong student community impacts students' success (Austin, 2002; Weidman et al., 2001). Because students are more likely to interact regularly with peers than with faculty members, it is hypothesized in this framework that peers, particularly more advanced peers, can play a role in how doctoral students learn to do research.

*2.4.9 Formal requirements and informal activities*

In the literature on socialization, Tierney & Bensimon (1996) recognized that socialization occurs in both formal and informal manners. They defined formal socialization as the activities that are specifically designed for newer members. In the context of doctoral education and individual academic departments formal requirements are those activities necessary for degree completion. These requirements have not changed significantly over time and they generally include: coursework, exams and a thesis (Gumport, 2005; Nerad, 2008). The formal requirements are placed within the parameters of the learning context because each academic department significantly shapes them.

In contrast, informal socialization is defined as more casual interactions (Tierney & Bensimon, 1996). For purposes of this study, informal activities in a doctoral program refer to

non-required activities and experiences in, across, and beyond academic departments. Some examples in doctoral education might include impromptu conversations in a student lounge, department seminars or lectures, student-organized groups, and professional conferences. Despite the myriad of informal activities and experiences that can occur, this study is interested primarily in the informal activities that contribute to students' development as researchers. Informal activities in the conceptual framework are represented as both in and out of the department's learning context to signify that many valuable informal activities may occur outside of the academic department.

### 2.5 Apprenticeship model as a method of learning in doctoral education

While theories of socialization have shown that students go through a developmental process that results in independent researchers, we know little about *how* doctoral students' learning is mediated. The theory of organizational socialization tells us that individuals are socialized through different activities, experiences, and relationships, which are shaped by the rules, culture, and traditions of the organization (Tierney, 1997; Van Maanen, 1976). It is these relationships, and the mediation of activities and experience, that requires more research. While this process is frequently described as an apprenticeship, there is no empirical research on the apprenticeship model in doctoral education to support this.

*Figure* 2 provides one possible interpretation of how the apprenticeship model may be mediating learning in doctoral education; particularly in terms of how doctoral students are taught to do research (pedagogy of research). As mentioned earlier, there is no research on the apprenticeship model in doctoral education and so this framework is developed by drawing from other bodies of research such as adult learning theory, craft labor, professional education, and

schooling. By synthesizing this literature we can begin to operationalize what the apprenticeship model might look like in doctoral education.

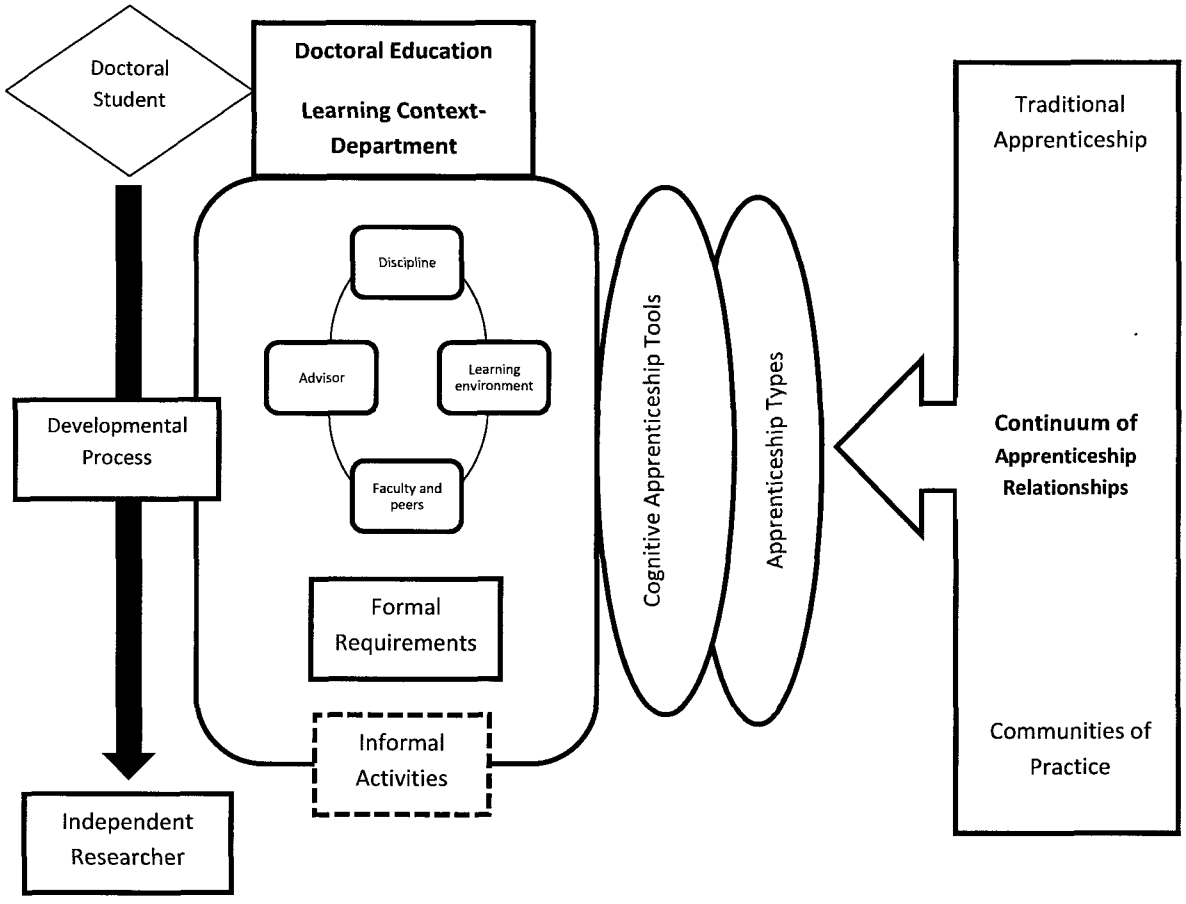


*Figure 2.* A conceptual framework of the pedagogy of research in doctoral education and the apprenticeship model

*2.5.1 Adult learning theory*

Theories of learning generally try to understand how new knowledge or skills are acquired or modified. These learning theories have generally fallen into three main categories or philosophical frameworks: behaviorism, cognitivism, and constructivism. Behaviorists have conceptualized learning as the formation of connections between stimuli and responses (e.g., B. F. Skinner). Cognitivists then criticized behaviorists' treatment of learners as animals responding

to stimuli and expanded the theory of behaviorism to view cognition and learning as a process that occurs within the learner (e.g., Gestalt, Piaget). The theory of constructivism was later developed based on the belief that humans generate knowledge and meaning from their experiences (e.g., Bruner, Dewey, Vygotsky).

Much of the scholarship on apprenticeship learning has emerged from research in the area of adult learning. Johnson and Pratt (1998) have summarized some of the key learning assumptions behind the apprenticeship perspective. First, learning is viewed as a process that changes internal schemas, where schemas are, "...the forms in which we summarize our general knowledge, beliefs, attitudes, and experience about people, places, events, objects and ideas." (p. 85). Upon entering a new experience, humans bring their previous schemas, which serve as "mini-theories" that guide how an individual might react to new situations. Over time, and with more experience, these schemas become more elaborate and connected to other schemas that then allow humans to handle more complicated or related problems with greater confidence. However, these schemas are all given added meaning and significance by the setting in which they are learned. For this reason, context is a second important feature of the apprenticeship perspective.

Situated learning is a concept that emerged from the theory of constructivism and it challenged the assumption that learning is an individualized process independent of context. Instead, learning is believed to be a function of the activity, context, and culture in which it is situated (Lave, 1988). The theory of situated learning suggests that schemas are more than just simple maps of knowledge, but rather are closely embedded in the contexts of their application.

While many of these ideas were not new (see the works of Bruner, Dewey, and Vygotsky), situated learning re-emerged during the late 1980's in response to concerns that

formal schooling had removed skills and knowledge from their real-world applications (Collins, Brown & Newman, 1989; Lave, 1988, 1993; Resnick, 1987). The concern was that students were not learning in authentic situations and it was believed that this would negatively impact students' ability to transfer newly learned concepts to other settings (Collins et al., 1989). These criticisms led to renewed interest in apprenticeship learning for many educators (Barab & Hay, 2001) and expanded the body of research on apprenticeships, particularly around adult learners (Johnson & Pratt, 1998; Lave & Wenger, 1991).

A third assumption of the acquisition of knowledge through the apprenticeship model was explained through a process called legitimate peripheral participation (Lave & Wenger, 1991). Using an anthropological lens, Lave and Wenger (1991) developed a theory of social learning by observing successful learning in apprenticeships outside of schools. They found that newcomers became part of a community of practice by gradually acquiring the knowledge, skills, and values from experts through their participation in everyday activities. Wenger (1998) defined communities of practice as composed of participants who were mutually engaged, had a joint negotiated enterprise, and a shared repertoire (i.e., routines, tools, ways of doing things, etc.). Lave and Wenger (1991) observed that new members were not outsiders, but they were, "...engaged in activities that, though peripheral to the community, [were] legitimate within the context of that community" (p. 37). By participating at the periphery of a community of practice and observing and interacting with others, new members would move to the center of the community over time. One way that this was evident was when new members would take on more complex tasks and assume greater responsibility for outcomes. Successful participation in an apprenticeship required learning to speak, act, and improvise in ways that made sense to the community.

Lave and Wenger (1991) came to understand apprenticeships as legitimate peripheral participation or the "relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice" (p. 29). While communities of practice and legitimate peripheral participation were observed in non-school apprenticeships, the theory has been applied to schools and even doctoral education (Capobianco, Diefes-Dux & Oware, 2006; Hager, 2003; Janson, Howard & Schoenberger-Orgad, 2004; Monaghan & Columbaro, 2009; Noonan, Ballinger & Black, 2007; Pallas, 2001). Many of these researchers have drawn on this in their general descriptions of doctoral education or in relation to studies of particular disciplines.

In sum, the apprenticeship perspective is based on three main ideas: (1) Human knowledge is constructed in the form of schemas, (2) These schemas are influenced by the contexts in which they were learned, and (3) Schemas are learned through legitimate peripheral participation which involves active, social, and authentic participation. Although this study was not designed to determine how doctoral students' schemas changed over time, it does allow for the exploration of legitimate peripheral participation in communities of practice across the three departments in this study.

*2.5.2 Labor research*

The traditional apprenticeship model is a historic relic of craft guilds from the middle ages, which were comprised of masters, apprentices, and journeymen (a trader or crafter who completed an apprenticeship). A master would hire a young apprentice, and in exchange for formal training in a skills craft, the apprentice would provide inexpensive labor. After fulfilling a set contract (typically around seven years), the apprentice would become a journeyman and then a master craftsman (Jacoby, 2001). At the time, men primarily held apprenticeships and they

functioned through very strict power dynamics between the master and the apprentice (Burmester, 2003) where the master had virtually all the power.

Apprenticeship training declined significantly when schooling became the primary vehicle for social mobility among societies (Jacoby, 2001). While apprenticeships are not as common in our contemporary society they continue today in the form of workplace trainings or specialized trainings (e.g., learning to become a bicycle mechanic). The U.S. Department of Labor's current definition of apprenticeship is a "combination of on-the-job training and related instruction in which workers learn the practical and theoretical aspects of a highly skilled occupation" (U.S. Department of Labor, 2008).

The most traditional definition of an apprenticeship relies primarily on the dynamics between the apprentice and one master. Although the apprentice learns to become part of a broader social organization in which the trade is embedded and has the opportunity to interact with the community, in a traditional apprenticeship the novice is reliant on one *master* for his or her training. In doctoral education the apprenticeship model is often described in a traditional way because it focuses primarily on the student-advisor relationship.

*2.5.3 Continuum of apprenticeship relationships*

The continuum of apprenticeship relationships has been isolated from the larger conceptual framework in *Figure* 3 in order to highlight some of the different interpretations of apprenticeships. In general, apprenticeships are defined as extended interactions between a learner and a more experienced practitioner(s) in a particular domain or task. One of the things that emerged from the literature on adult learning theory and the labor research were differences in the number of individuals engaged in an apprenticeship. The continuum in *Figure* 3 illustrates a spectrum of relationships that can exist between traditional apprenticeships (between one

master and one novice) and communities of practice (interactions within groups of people who have a shared endeavor). This continuum was developed as part of the conceptual framework to better understand who facilitates apprenticeship relationships within each department.

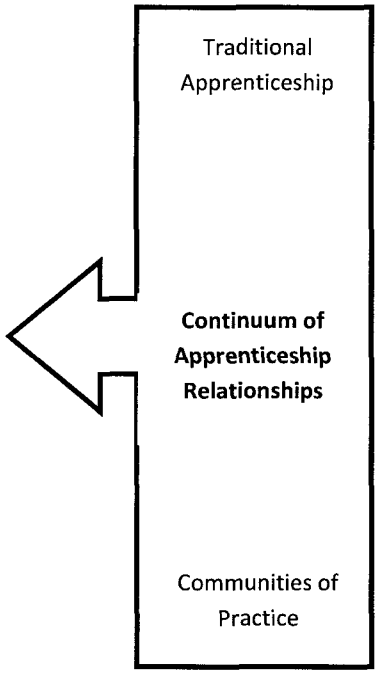


*Figure 3*. Continuum of apprenticeship relationships

*2.5.4 Apprenticeship types*

The next addition to the conceptual framework is the notion of different "apprenticeship types," which comes from literature on professional education. The Carnegie Foundation for the Advancement of Teaching initiated a comparative study of education across several professions (clergy, medical, engineering, law and nursing). In order to draw comparisons across educational practices in these professions, Sullivan, Colby, Wegner, Bond & Shulman (2007) expanded on the traditional apprenticeship metaphor and identified three types of apprenticeships, which represent different facets of professional expertise and pedagogical intention. This included three apprenticeship types: (1) Intellectual or cognitive, (2) Skill-based, and (3) Identity and purpose.

The first apprenticeship, intellectual or cognitive, refers to the content knowledge and habits of mind within an academic domain. This type of apprenticeship, they argued, was already well recognized by those in academia. The second apprenticeship is skill-based, and it refers to the unique set of skills, which are often used by competent practitioners in their every day practices (e.g., designing buildings or performing surgery). In the educational setting, students typically begin with simple tasks and gradually advance to be able to complete more complicated activities. The third apprenticeship, identity and purpose, refers to learning of the values and attitudes that are commonly shared by those in a professional community. Sullivan et al. (2007) used these three apprenticeships types as an analytical lens to better understand professional education. Their expansion of the definition of apprenticeship beyond the cognitive domain was unique across the literature on apprenticeships because it specifically addressed skills and identity formation. Golde (2008) has argued that the three apprenticeships identified by Sullivan et al. (2007) could significantly help with efforts to reform doctoral education.

The addition of distinguishable apprenticeship types to the pedagogy of research conceptual framework directly relates to what we know about the stages of doctoral student development. In Table 3, I have juxtaposed stages of development (Bowen & Rudenstine, 1992) with specific program activities (Wulff & Nerad, 2006) and the three apprenticeship types (Sullivan et al., 2007) in order to better understand how specific activities and experiences may help facilitate student development. However, these three stages are fluid depending on the individual learner and the context of the discipline or field.

Table 3

*Stages of Development Linked to Program Activities and Apprenticeship Types*

| **Stages of doctoral student development** | **Program activities & Apprenticeship types** |
|---|---|
| *Entry and adjustment* occurs during a student's first year when he/she makes the transition from outsider to insider. Students are knowledge consumers. | • Participating in orientations *(habits of mind, identity)*<br>• Taking courses and acquiring content knowledge *(habits of mind, skills)*<br>• Acquiring appropriate research and teaching skills via research assistantships and teaching assistantships *(habits of mind, skills, identity)* |
| *Development of competence* begins in the second year and finishes when the student has advanced to candidacy. Students demonstrate expertise as knowledge consumers. | • Exams *(habits of mind, skills)*<br>• Taking courses *(habits of mind, skills)*<br>• Acquiring appropriate research and teaching skills via research assistantships and teaching assistantships *(habits of mind, skills, identity)* |
| *Research stage* involves the task of identifying an appropriate topic for and completing the dissertation. Students as knowledge producers. | • Identifying and refining topic *(habits of mind, skills)*<br>• Dissertation research *(habits of mind, skills, identity)*<br>• Dissertation writing *(habits of mind, skills, identity)*<br>• Preparing for employment *(habits of mind, skills, identity)* |

The inclusion of apprenticeship types (habits of mind, skills & identity) can help us to further differentiate how apprenticeships might be facilitated through different activities in doctoral programs. One goal of this study is to determine whether or not participants distinguish between different types of apprenticeships in their doctoral programs.

*2.5.5 Cognitive apprenticeship tools*

The final addition to the conceptual framework is the use of cognitive apprenticeship tools. These tools were derived from the work of Brown, Collins and Duguid (1989) who examined the theory of situated learning in the context of formal schooling. Brown et al. believed that meaningful and transferrable learning could only occur when it was embedded in the social and physical context in which it was normally used. After observing several innovative and effective examples of situated learning in mathematics, reading, and writing, they developed a model of learning called cognitive apprenticeships. This model was based on two assumptions: (1) learning is situated (Lave, 1988), and (2) activity, concept, and culture are interdependent and learning must include all three things (Brown et al., 1989). Brown et al. utilized the term apprenticeship because it emphasized the relationship between activities, concepts, and cultures and they used cognitive as a way to distinguish it from other types of apprenticeships (i.e., craft or trade).

Cognitive apprenticeship tools were developed to allow for learning to be facilitated through guided experience. Using these tools, concepts are situated in their contexts of use and processes that are typically carried out internally by practitioners can

be externalized and made transparent (Collins et al., 1989). The six cognitive apprenticeship tools are:

1. *Modeling* involves the student observing an expert performing a task. Observation helps students to build a conceptual model of the processes that are required to accomplish the task.
2. *Coaching* consists of observing students while they carry out a task and offering hints, challenges, scaffolding, feedback, modeling, reminders, and new tasks aimed at bringing their performance closer to expert performance.
3. *Scaffolding* refers to the supports the teacher provides to help the student carry out the task.
4. *Articulation* includes any method of getting students to explicitly state their knowledge, reasoning, or problem solving processes in a domain.
5. *Reflection* involves enabling students to compare their own problem solving processes with those of an expert, another student, and ultimately, an internal cognitive model of expertise.
6. *Exploration* involves guiding students to a mode of problem solving on their own.

(Collins, 2006, p. 50-51)

Through the explicit use and articulation of these six cognitive tools, students are able to "...acquire, develop, and use cognitive tools in authentic domain activity" (Brown et al., 1989, p. 39) because instructors are making their thinking visible to students.

It appears that there is growing interest in cognitive apprenticeship teaching methods among researchers and practitioners of doctoral education. Stewart & Lagowski

(2003) have discussed the value of cognitive apprenticeships in graduate chemistry education and Austin (2009) utilized this method in the development of a first-year doctoral seminar in a higher education program.

The addition of cognitive apprenticeship tools to the framework serves to operationalize what the dynamics of an apprenticeship relationship might look like in doctoral education. One goal of this study is to look for any evidence of the use of cognitive apprenticeship tools across three departments that will be examined.

*2.5.6 Usefulness of the framework*

A major strength of this framework is that it views learning in doctoral education from a constructivist perspective and highlights the unique situated learning environment that doctoral education provides. I would argue that doctoral education is inherently one of the most situated educational programs in all of formal schooling. By this I mean that in most other education programs the learning process is removed from its everyday context of practice. However, doctoral programs are located in sites of research production and doctoral students have the opportunity to learn to do research and practice their skills while observing expert practitioners conducting research.

An additional benefit of this framework is that it provides a more robust definition of the apprenticeship model by combining relationships, types, and tools. This comprehensive definition is a significant departure from the traditional apprenticeship model of advisor and student that has been dominant in the literature on doctoral education. While other scholars of graduate education have also recognized many of these concepts as valuable to our understanding of doctoral education (Austin, 2002,

2009; Golde 2008; Stewart & Lagowski, 2003), no one has ever brought all of these models together.

# CHAPTER 3

# METHODOLOGY

This dissertation provides a qualitative exploration of the way in which doctoral students learn how to do research across three academic departments at a prominent research university in the western United States. The following sections outline the research methodology used in the study as well as the methods of data collection, site selection, selection of the disciplines and departments, selection of the participants, data analysis, the techniques undertaken to meet the criteria of trustworthiness in qualitative research, and limitations

## 3.1 Methods of data collection

Qualitative methods were used because of the highly exploratory nature of the study and my interest in gathering contextually rich and detailed data (Merriam, 1998). This inquiry utilized a "naturalistic paradigm" (Lincoln & Guba, 1985) and was guided by the following assumptions:

- "There are multiple constructed realities that can be studied only holistically"
- "The inquirer and the 'object' of inquiry interact to influence one another"
- "Knower and known are inseparable"
- "All entities are in a state of mutual simultaneous shaping" (p. 37-38).

The key empirical materials of this qualitative study consisted of interviews with doctoral candidates and faculty members. In these interviews, the participants described their everyday experiences in doctoral education and the meaning around their experiences (Erickson, 1986), revealing diverse and multiple ways of interpreting how doctoral students learn to do research across three different fields.

The primary mode of data collection consisted of in-depth, semi-structured interviews with doctoral candidates and faculty. The protocols for faculty and student interviews and surveys are included in Appendix A and B.[3] All interviews were semi-structured and were generally guided by the interview protocols, with simultaneous probing and follow-up questions that varied from interview to interview. The method of semi-structured interviews allowed me to conduct ongoing interpretation and modification (Bogdan & Biklen, 2003), which was valuable in understanding each individual's perspective.

The interview protocols for both doctoral candidates and faculty members were guided by the research questions and were tailored to reflect variations in the formal requirements of each doctoral program.[4] Participants were first asked to describe the nature of research in their field and the types of skills needed to do research. From there, faculty members were asked how their doctoral program prepared students to do research and students were asked to describe how they had learned to do research. Capturing both the faculty members' and students' perspectives enabled me to describe and interpret the pedagogy of research within three different departments by highlighting the formal requirements and informal activities that most contributed to students' development as researchers. Finally, If not already discussed by the participant, I intentionally asked participants to comment on apprenticeship relationships in doctoral education and their direct experiences with them.

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[3] A pilot study was conducted from March 14th-21st in 2009 to test and revise the interview protocols The pilot study included two faculty (associate and full professors) and two doctoral candidates from four different academic departments at State University At the end of each interview the pilot participants were asked to reflect on their interview experience and to comment on the interview questions From that feedback the interview protocols were revised

[4] Information about the formal requirements of each doctoral program was obtained from the doctoral student handbook, program review reports, and from informational interviews with department administrators

The doctoral candidates were also asked to complete a brief nine question survey focusing on academic background information. The purpose of this post-interview demographic questionnaire was to confirm general information about the candidates regarding their educational background, the year they entered the Ph.D. program, and career goals (See Appendix E for complete list of questions).

Document analysis of two types of documents, doctoral student handbooks and program review reports, served as the third type of data in this study. Document analysis is an unobtrusive data collection strategy that can provide insight into the social phenomenon under investigation (Hatch, 2002). Doctoral student handbooks were available from each department and they provided an overview of the formal requirements (i.e., coursework, exams, and dissertation) that doctoral students needed to complete in order to graduate. Students refer to these handbooks and the policies within them for guidance, as they are an important reference source. Department handbooks were obtained before the study commenced online or from a department administrator.

The second set of documents reviewed included the most recent program review report. State law requires departments to conduct a program review every ten years. The reviews are facilitated by the Graduate School at State University. As part of that process, departments must write a self-study report, which is combined with an external review report. The complete program review report for each department was downloaded online from the State University Graduate School website and reviewed. The primary function of reviewing the handbook and program review report from each department was: (1) to establish the history and context of each academic program, and (2) to identify each

doctoral program's structure. These documents also assisted with department specific details informing the semi-structured interview protocols.

The final component of data collected was a researcher's journal. Prior to the onset of the study I recorded my own assumptions, worldview and theoretical orientations. The purpose of doing this initial reflection was to bring awareness as to how my own beliefs were shaping my approach to the research study (Rossman & Rallis, 2003). A second set of notes was collected immediately after each interview in which I wrote down my initial thoughts and reactions to the interview. The final set of entries included ongoing reflections about the progress of the study, any challenges encountered, and comments on the methodological decisions made throughout the research process. The overall purpose of the researcher's journal is to help with data analysis and interpretation and to "...provide a means for accounting for personal biases and feelings" (Hatch, 2002, p. 87).

**3.2 Site selection**

In selecting a site to conduct this research, I purposefully looked for a large research university that was very active in the production of Ph.D.s. Selecting an institution with high research activity and a high production of Ph.D.s would make it "information-rich" (Patton, 1990) around the practices of doctoral education. In other words, this would help ensure that participants, particularly faculty members, would have direct experience working with doctoral students and thinking about the pedagogy of research in their disciplines.

Given these criteria, this study took place at State University,[5] a state-supported research university with very high research activity (The Carnegie Foundation for the Advancement of Teaching, n.d.). State University has over 80 doctoral programs and it awarded over 600 Ph.D.s during the 2009-2010 academic year.[6] Only one site was selected for this study in order to hold different institutional variables (e.g., graduate school requirements, institutional culture, cost of living, etc.) constant.

### 3.3 Selection of disciplines and departments

Three distinct disciplinary areas were selected for this study in order to capture the various "attitudes, activities and cognitive styles...which are bound up with the characteristics and structures of the knowledge domains" (Becher & Trowler, 2001, p. 42). Several researchers recognize that disciplinary cultural norms shape the pedagogical content knowledge within each discipline (Donald, 2002; Shulman, 1986).

In order to select three disciplines I initially referred to Donald's (2002) study of how students learn to think across different disciplines. Her differentiation of methods of inquiry across those disciplines helped me identify three distinct disciplinary areas with as much methodological variability as possible (p. 24):

- Hermeneutics- Interpretation; construction of textual meaning through a dialectic between understanding and explanation (e.g., English literature)
- Critical thinking- A reasoned or questioning approach in which one examines assumptions and seeks evidence (e.g., English literature)
- Problem solving- Steps for formulating a problem, calculating, and verifying the logic used (e.g., Physics, engineering)

[5] All the names of institutions and individuals in this study are pseudonyms.
[6] Obtained online from State University Graduate School website.

- Scientific method- Objective methods, replicability of findings, skepticism (e.g., Physics)
- Expertise- Well-developed representation of knowledge, action schemas (e.g., Physics, education

In addition to selecting disciplines that represented a wide range of methodological variability, two additional criteria were used in selecting the three departments to be included in this study. The first key requirement for each academic department was that it needed to be highly ranked by the National Research Council (NRC) (Goldberger, Maher, & Flattau, 1995). Although the methodology behind the NRC rankings has been criticized, these rankings are among the most influential and commonly used rankings in academia (Ostriker, Kuh, & Voytuk, 2003) in part because they are determined by the reputation of the quality of faculty in each academic program. Ostriker, Kuh, & Voytuk (2003) suggest that effectiveness in graduate education is confounded with the research reputation of faculty members, making these highly ranked programs worth examining as sites of effective production of Ph.D.s. One could reasonably assume that the best researchers are most likely to produce the best doctoral students and that these programs will represent successful models of doctoral education. The three academic departments selected for this study were all highly ranked by the 1995 rankings, and two of the three departments remained high ranked in the 2010 rankings (State University Graduate School website).

The second key requirement was that departments selected for this study could not be undergoing a program review,[7] or external accreditation at the time of the study.

[7] At State University, like at many other institutions, academic departments must undergo a program review every ten years.

The purpose behind this was to ensure that the department would not be saturated by outsiders. However, programs that had undergone a program review more recently would be favored in an effort to have a reasonably current program review report.

As a result of the aforementioned criteria, three academic departments from State University were selected for this study (See Table 4).[8] Academic departments served as the primary site for data collection because the locus of control for doctoral education primarily rests within academic departments (Berelson, 1960; Bowen & Rudenstine, 1992; Gumport, 1993; Nerad & Miller, 1996).

Table 4

*Academic Departments Selected for this Study*

| **Department** | **Methods of inquiry (Donald, 2002)** | **Most recent program review[9]** |
|---|---|---|
| Bioengineering | Problem solving, scientific method, and expertise | 2000-2001 |
| Comparative Literature | Hermeneutics and critical thinking | 2002-2003 |
| Sociology | Critical thinking and scientific method | 2003-2004 |

*3.3.1 Bioengineering*

Bioengineering, or biomedical engineering, is a relatively new field in engineering. As a field of study, bioengineering bridges engineering, biology and medicine, in an effort to solve biomedical problems with engineering principles, tools, and techniques. Students studying bioengineering must bridge biology, a pure natural science, which requires "inductive thinking," and engineering, an applied physical

[8] For additional information on enrollment and degrees awarded see Appendix F and G.
[9] Obtained from the Graduate School website at State University.

science, which requires "hard thinking" or applying structured knowledge to unstructured problems (Donald, 2002). To do this, the field relies on several methods of inquiry: problem solving, scientific method, and expertise. This interdisciplinary field draws from areas such as: biomaterials, cellular, tissue and genetic engineering, medical imaging, orthopedic bioengineering, and systems physiology.

According to the most recent degree completion data from the Survey of Earned Doctorates, 828 biomedical engineering Ph.D.s were awarded in 2009 (NSF Division of Science Resources Statistics, 2010). Students that receive a Ph.D. in bioengineering typically pursue careers in industry and academics (Madhavan, Oakley, & Kun, 2008).

*3.3.2 Comparative Literature*

Comparative literature is a field in the humanities where the primary understanding is with human culture where faith is placed on the autonomy of scholars and their ability to be critical and creative (Donald, 2002). It is an interdisciplinary field, which examines two or more types of texts typically across linguistic, cultural or national groups. Comparatists are typically proficient in several languages and are well acquainted with the major texts (literary or other) found in those languages. In order to do this type of work, the field relies on several methods of inquiry: hermeneutics and critical thinking.

According to the most recent degree completion data from the Survey of Earned Doctorates, 179 comparative literature Ph.D.s were awarded in 2009 (NSF Division of Science Resources Statistics, 2010). Many of the students that receive a Ph.D. in the humanities aspire to tenure-track teaching positions at four-year colleges and universities (Nerad, 2009; Sadrozinski, Nerad, & Cerny, 2003). According to a recent publication on the Graduate Education Initiative in the humanities launched by the Mellon Foundation in

1991,[10] fewer students are finding tenure-track positions upon leaving graduate school. However, of those who start out in a non-tenure-track position the majority of them will move into a tenure-track position within three years (Ehrenberg, et al., 2010).

*3.3.3 Sociology*

Sociology is a field in the social sciences which examines a wide variety of topics and is therefore broad in terms of its scope and its application of theories and methods. Sociology, like other social sciences, serves as an, "...intermediary to the physical sciences and the humanities with a wide range of methods and validation processes" (Donald, 2002, p. 132). In sociology, like in all social sciences, multifaceted thinking is required of its students (Donald, 2002). In order to do this type of work, the field relies on several methods of inquiry: critical thinking and scientific method.

According to the most recent degree completion data from the Survey of Earned Doctorates, 664 sociology Ph.D.s were awarded in 2009 (NSF Division of Science Resources Statistics, 2010). A recent study by the Center for Innovation and Research in Graduate Education (CIRGE) at the University of Washington titled, *Social Science Ph.D.s—Five+ Years Out (SS5)*, surveyed a national sample of more than 3,000 social science Ph.D. recipients, 500 of which were sociologists, five or more years after they graduated. Among these sociologists, three-fourths of them wanted to become a professor at the time of graduation and 78% of those were professors at the time of the survey (Nerad, et al., 2007).

**3.4 Selection criteria for study participants**

All participants were affiliated with one of the three departments at State University: Bioengineering, Comparative Literature, and Sociology. My sampling

[10] Comparative literature was among the 14 different disciplines included in the Mellon study.

strategy for both faculty and doctoral candidates was purposeful criterion sampling in that I sought individuals who fit particular predetermined criteria (Patton, 1990).

*3.4.1 Faculty members*

In this study I targeted associate or full professors because they were more likely to possess moderate to extensive experience teaching and guiding doctoral students. In this study, moderate to extensive experience indicated that these faculty members had taught doctoral level courses, chaired four or more dissertations, and had been a committee member on four or more doctoral student committees. Additional faculty members were selected because they played a significant administrative role (e.g., department chair and lead graduate student advisor) in their department, which made them more likely to be involved in ongoing conversations around doctoral education and have extensive knowledge about the Ph.D. program and the purpose behind program requirements as well as bringing unique insights into the current needs and experiences of the department's graduate students.

The purpose of including faculty members from the three departments was to gain insight into what skills students needed in order to do research in the field, the purpose and function of the department's program requirements, and to learn about individuals' pedagogical approaches to doctoral education.

*3.4.2 Doctoral candidates*

Doctoral candidates were selected to participate in this study because they were near the end of their studies and had successfully completed the majority of activities and experiences in their academic department. By advancing to candidacy these students had completed the coursework phase of their program and had successfully completed their

general examinations and received approval to work on their dissertation projects by a dissertation committee. In addition to being further along in their program, it was assumed that this group of students would have had more time to reflect on what was more or less significant in their learning how to do research in their fields.

The purpose of interviewing doctoral candidates from the three departments was to learn what skills they felt they needed to do research in the field, how they felt they learned those skills, from whom they felt they learned those skills, and whether they felt they had learned them through apprenticeship relationships with others. Given the scope of the research questions, this study does not assess whether or not these students actually acquired the skills necessary to do research in their field.

### 3.5 Recruitment and selection of participants

Faculty members were identified online on department websites and were targeted according to their faculty rank and administrative titles. I recruited faculty members individually via email, including a copy of the consent form (see Appendix C and D for copy of faculty and student consent forms). Table 5 illustrates the number of faculty contacted and the number of faculty members who agreed to participate.

Table 5

*Faculty Member Solicitations and Final Sample Size*

| | | **Bioengineering** | **Comparative Literature** | **Sociology** | **Total Interviewed** |
|---|---|---|---|---|---|
| **Faculty members** | **Contacted** | 12 | 11 | 11 | 34 |
| | **Agreed** | 3 | 3 | 4 | 10 |

In order to identify doctoral candidates across the three academic departments, I solicited the assistance of department administrators. These department administrators served as general advisors to the graduate students in the program and regularly interacted with this group of students. I prepared an initial email introducing myself and my study and asked each department administrator to send it to doctoral students who had advanced to candidacy. Shortly thereafter, I emailed these students to request their participation in my study. The only exception to this was in the Department of Comparative Literature where the Department Chair also provided me with a list of students to interview following our interview. Table 6 illustrates the number of doctoral candidates contacted and the number of faculty members who agreed to participate.

Table 6

*Doctoral Candidates Solicitations and Final Sample Size*

| | | **Bioengineering** | **Comparative Literature** | **Sociology** | **Total** |
|---|---|---|---|---|---|
| **Doctoral candidates** | **Contacted** | 9 | 12 | 7 | 28 |
| | **Agreed** | 7 | 7 | 7 | 21 |

All of the faculty interviews took place in faculty members' offices. Student interviews took place in several different locations: student offices, department conference rooms, in the library, the student union building, at the university bookstore, and on the computer utilizing Skype.[11] Interviews were conducted between May 2009 and February 2010 and each interview lasted approximately 50-90 minutes.

[11] Skype is a software application that allows users to make voice calls over the Internet.

While some demographic information was collected (e.g., sex, student age, student career goals) additional demographic information was not collected in order to maintain participants' confidentiality.

*3.5.1 Sample from the Department of Bioengineering*

Table 7

*Sex of Participants from the Department of Bioengineering*

| | **Faculty members** | **Doctoral Candidates** | **Total** |
|---|---|---|---|
| **Men** | 3 | 4 | 7 |
| **Women** | - | 3 | 3 |

Among the faculty participants from the Department of Bioengineering I interviewed two full professors and one associate professor. One of these professors was the designated faculty advisor of graduate students. The interviewed faculty had a broad range of research interests including: molecular bioengineering, biomaterials, imaging, neural engineering, and understanding nature through engineering.

A total of seven doctoral candidates were interviewed, three women and four men. At the time of this study, the age range of the student participants was 27-36 years old and all of the students interviewed entered the Ph.D. program between 2004 and 2005. Three of the students had master's degrees from another institution before entering the Ph.D. program and two of the students had previously worked in industry. In terms of their career goals, only one of the students interviewed planned to pursue a career as a

faculty member. The remaining students had plans to work in industry and other non-academic sectors[12] (e.g., Biomaterials Company, intellectual property law).

*3.5.2 Sample from the Department of Comparative Literature*

Table 8

*Sex of Participants from the Department of Comparative Literature*

| | **Faculty members** | **Doctoral Candidates** | **Total** |
|---|---|---|---|
| **Men** | 2 | 4 | 6 |
| **Women** | 1 | 3 | 4 |

Among the faculty participants from the Department of Comparative Literature I interviewed two associate professors and one full professor. One of these professors was the Department Chair and another professor was the designated faculty advisor of graduate students in the department. The faculty interviewed had a broad range of research interests that spanned geographic regions and types of texts (literary, visual and theoretical).

A total of seven students were interviewed, three women and four men. Recruiting student participants proved a bit challenging because this program was smaller than the other two and a large cohort of students had graduated the year before. At the time of this study, the age range of the student participants was 31-47 years old and all the students interviewed had entered the program between 2003 and 2005. Unlike the

[12] Since 2001-2002 academic years, the American Institute for Medical and Biological Engineering (AIMBE) Academic Council has collected data on graduating bioengineering students from US institutions. Data from 2001-2004 showed that of the 193 Ph.D. graduates, 44.5% continued their education, 44.5% obtained a job, 3% were seeking employment, and 8% were unknown (Enderle, 2008).

interviewees in the other two departments, four of the students grew up and completed their undergraduate and/or master's degrees outside of the United States. All of the students except one had previous work experience prior to entering the Ph.D. program. In terms of their career goals, all of the students wanted to obtain a tenure-track position in a small college or university. One student was additionally interested in a research position, but did not specify where.

*3.5.3 Sample from the Department of Sociology*

*Table 9*

*Sex of Participants from the Department of Sociology*

| | **Faculty members** | **Doctoral Candidates** | **Total** |
|---|---|---|---|
| **Men** | 3 | 3 | 6 |
| **Women** | 1 | 4 | 5 |

Among the faculty participants from the Department of Sociology I interviewed three full professors and one associate professor. One of these professors was the current Department Chair and another professor was the designated faculty advisor of graduate students in the department. The faculty had a broad range of research interests with a few overlapping areas of interest: Demography, Race/ethnicity, and Criminology.[13]

A total of seven student candidates were interviewed: four women and three men. At the time of this study, the age range of the student participants was 30-36 years old.

[13] Complete list of faculty research interests according to their web pages: Criminology, Culture and media, Demography, Family, Gender, Law & deviance, Occupations and organizations, Political sociology, Quantitative methods, Race and Ethnic Relations, Sociology of science, and Urban Community.

Students entered the program between 2001 and 2004, and three of them came in with master's degrees from other institutions (two in the field of sociology). However, every student interviewed received a non-terminal master's degree in sociology from the department at State University. All but one of the students had worked before beginning this program and six of the students said they were interested in becoming faculty members when they began their program. Three of the students had changed their career goals from the time that they started the program and were now more interested in pursuing non-academic research jobs after graduation (e.g., working for the U.S. Government, policy work).

**3.6 Data analysis**

According to Merriam (1998), data analysis is the process of consolidating, reducing and interpreting the data in an effort to make meaning of it. In qualitative research analysis begins as early as the conceptualization stage when one's understanding of the phenomenon is preliminary, but still influencing early decisions that shape the study (Rossman & Rallis, 2003). The following steps of data analysis, identified by Rossman & Rallis (2003), were used in this study: (1) Organize the data, (2) Familiarize yourself with the data, (3) Generate categories and themes, and (4) Code and interpret the data.

*3.6.1 Organizing the data*

The primary data source in this study was interview transcripts. I transcribed each interview and edited the transcripts so that all potentially identifying information (i.e., names, places) was removed. Pseudonyms were also assigned to each interview participant to ensure their confidentiality. For the sake of readability, common patterns of

speech that do not convey information such as "um," "you know," and "ah" were also deleted. All of the interview transcripts were uploaded to ATLAS.TI (V5.5), a workbench for the qualitative analysis of large bodies of textual data.

*3.6.2 Familiarizing oneself with the data*

After each interview I wrote my post-interview notes where I reflected on the interview, on the content discussed, my initial impressions and other questions the interview generated. Once I completed both the faculty and student interviews in each department I also recorded several topics that seemed to permeate the collective set of interviews in each department. By transcribing the interviews I was further able to familiarize myself with the data and not only remind myself of the content, but also take note of any additional thoughts or reactions. Finally, I created short summaries (2-3 sentences) of the key topics discussed during each interview (Rossman & Rallis, 2003).

*3.6.3 Generating categories and themes*

With all of the interviews uploaded to ATLAS.TI (V5.5), I went through each transcript and coded them deductively and inductively. A set of categories and codes emerged from the literature, the conceptual framework, reviews of the student handbooks and program review final reports, and the post-interview notes. These analyst-constructed categories (Patton, 2002) included codes like: formal requirements, informal activities, advisor, apprenticeship, nature of research in discipline, and skills needed to do research in each discipline (See Appendix H for list of codes). In order to not privilege the researcher's meanings over those of the participants, an inductive analytic strategy was used in order to identify categories that were uniquely expressed by the participants (Rossman & Rallis, 2003). Some of these categories included: job market, reputation of

program, what it takes to be successful in graduate school, prior educational experiences, and prior professional experiences.

*3.6.4 Coding the data*

During the first pass at coding I identified words or short phrases that captured a priori categories (Emerson, Fretz & Shaw, 1995) that were deductively identified as the analyst-constructed categories. In the second round of coding, I focused on categories that were expressed by the participants, which spoke directly to the research questions. Although 69 codes were identified, some codes were more salient to the research questions and/or were more populated with quotes across participants. Using the ATLAS.TI software I was able to group quotations according to categories that had 5 or more quotes among interviewees within each department. In other words, all of the quotes that pertained to the topic of "skills needed to do research" were grouped together.

*3.6.5 Rigor*

There were several strategies that I used to help enhance the credibility and rigor of this qualitative study. First, multiple sources of data from multiple points in time were used to build a better understanding of how doctoral students learned to do research (Rossman & Rallis, 2003): (a) the program review final reports were conducted prior to the study and provided a historical account of each department, (b) the graduate student handbooks provided a current interpretation of the policies and procedures in each department, and (c) participant interviews with faculty members and doctoral candidates provided unique perspectives on the pedagogy of research in each department.

Second, I engaged in member checks (Hatch, 2002) or participant validation (Rossman & Rallis, 2003) in which I asked my participants to review their interview

transcripts and elaborate or comment on the transcript in an effort to elicit further information for data analysis. I sent the transcripts to each participant shortly after completing the transcription soliciting their feedback. The participants only made minor editorial changes to their transcripts.

Third, I engaged in peer debriefing (Lincoln & Guba, 1985) in which I engaged in critical and sustained discussions with members of my dissertation writing group to discuss my emerging ideas. All of the participants in the group were doctoral students in the field of education. However, they specialized in other areas, which meant that they had some distance from my topic and from the data. During these peer checks I shared samples of interview transcripts and discussed my coding strategies. My peers gave me feedback on my coding, my analysis and initial findings from early drafts of my chapters. The purpose of sharing my data with my colleagues was to check my own interpretations and for them to point out other possible interpretations. One of the major benefits of these peer checks was it helped me to identify additional codes that I hadn't considered as well as other possible interpretations of my findings.

Fourth, because the researcher is the key instrument in qualitative research (Merriam, 1998), it was critical to make every effort to try and prevent my pre-judgments or biases from impacting the findings. Although it was impossible to avoid this entirely, I took several steps to monitor my subjectivities. First, I wrote an initial *investigator's position* statement (Merriam, 1998) in which I clearly described my assumptions going into the study. Second, I created an *audit trail*, which provided a detailed account of how the data was collected, how it was analyzed and descriptions about how decisions were made during the study. Third, I kept a running journal throughout my data collection

concerning my initial observations about the data. These strategies not only helped me to keep track of any minor methodological modifications that were made (which allowed me to provide an accurate account of the research design of the study), [14] but it also helped me to identify my voice in the conceptualization and interpretation of this study. As a doctoral student who is also learning how to become an educational researcher, my own experiences and observations were clearly relevant to this study and they impacted how I conceptualized this study and how I interpreted the data. However, I also made an effort to identify some of these beliefs early on and properly identify them as such (see section 1.4).

*3.6.6 Interpreting the data*

Interpretation of the data was a complex and reflexive process that was facilitated through the use of thick description (Geertz, 1973). I identified a common set of codes across the three departments and also included codes that were more unique to each department but which were relevant to the research questions. In an effort to tell a story of the participants' experiences in the department I paraphrased direct quotations and provided a summary for both the deductive and inductive categories. Then I assessed these interpretations in relation to the conceptual framework developed for this study and looked for confirming and disconfirming evidence of the concepts described in the framework.

The final and most challenging interpretive task was the cross-department analysis. The purpose of doing this cross-department analysis was to inform the conceptual framework developed for this study. In this analysis I compared the formal

[14] An example of a methodological change was soliciting the assistance of department administrators in recruiting doctoral candidates for this study. Initially I had planned to contact students directly, but it proved more effective to have the department administrators introduce me to students and then follow-up.

requirements and informal activities that contributed to doctoral students' learning of how to do research across the three fields. I then explored the apprenticeship models that emerged from each program and examined the similarities and differences. Finally I examined the usefulness and limitations of the conceptual framework in light of the cross department analysis.

### 3.7 Limitations

As in any study, there are certain limitations to the findings. The purpose of qualitative research is to understand the meaning people have created in a particular setting (Merriam, 1998), meaning that generalizability is not a crucial standard of qualitative research (Rossman & Rallis, 2003). Instead, the findings should be interpreted in terms of the particulars of each academic department and tentatively applied beyond (Lincoln & Guba, 1985). In this case, the results will be used to modify the conceptual framework of the pedagogy of research in doctoral education and apprenticeship relationships in chapter seven of this study. Consequently, the conceptualization and design of the study as well as the descriptions made of participants in these three departments are limited by my own personal interpretations of their accounts as well as the information that the participants chose to share during the interview. While I made every effort to triangulate my data and conduct member checks, several limitations remain present in my analysis as described below.

One limitation of this study is related to the sample selection of doctoral student candidates. By choosing more advanced students I was attempting to ensure that the students had engaged in the majority of activities and experiences available in the program and had reflected on their usefulness. However, by limiting my sample to

advanced students who had not yet completed their dissertations, I was not able to get a good sense of the role of students' dissertations had in their learning of how to do research. As a result, it would be beneficial to interview doctoral students at all stages and also include recently minted doctorates.

Related to this limitation, by limiting my sample to advanced students I failed to capture students at earlier stages of the program as well as students who might not have successfully completed the program (attrition). We know that the majority of graduate students who fail to earn a doctorate leave a program before advancing to candidacy (Nerad & Cerny, 1993).

Additionally, while a purposeful selection of participants was intended, the participation of those interviewed was voluntary and participants self-selected into this study. Although there were no major signs of this, the self-selection of participants, particularly the students, may have attracted students who had specific concerns or negative experiences in their department.

Finally, due to resource constraints and the need to limit the amount of interviews conducted, the descriptions of each department are not comprehensive because only a small sample of each program was included in this study. It is possible that the experiences and beliefs raised by the interview participants might have been dramatically different from those of other similar status department members. However, the participants did provide insights into their own experiences with the pedagogy of research in their fields.

Despite these limitations, the strength of this study is that it provides a rich description of the activities, experiences, and apprenticeship relationships, which facilitate students' learning of how to do research in their discipline.

# Chapter 4

# DEPARTMENT OF BIOENGINEERING

*If you don't love science you're not going to succeed at it...it's a process of saying, this is a problem I'm really interested in doing and I'm going to do whatever it takes to solve this problem. It's something you can only do on your own. A lot of other people can help you, but ultimately you have to do it on your own.*

-Bioengineering faculty member

*My professors can't help me on my day-to-day basic questions. They can help me with the direction of my research in the next three months, six months, and several years. But, it is my colleagues, lower level colleagues that will help me with today, this hour, and this minute.*

-Bioengineering doctoral candidate

## 4.1 Bioengineering at State University

The Department of Bioengineering at State University is a nationally recognized program. As a department, they recognize that there has been tremendous growth in the field which they attribute to the "...increased recognition of the value and need of Bioengineering, expanding Bioengineering frontiers and opportunities, and rapidly-developing industry" (Graduate School Self Analysis: The Department of Bioengineering, 2001). At the time of the study, the department had over 30 core faculty members, over 100 graduate students, and over 130 undergraduate student majors. Over a ten year period (1999-2009), the department has awarded, on average, 16 Ph.D.s a year (State University Graduate School website).

The goal of the graduate program is to prepare students for careers in industry and the academy. The main objectives of the program are:

- To provide bioengineers with an in-depth understanding of mathematics, engineering principles, physics, chemistry, and molecular, cellular, and organ system physiology and biology
- To train bioengineers to apply basic sciences to medical and biological problems, using engineering principles
- To train bioengineers to recognize and provide engineering solutions to clinical problems
- To train students to do bioengineering research
- To train students to teach bioengineering at the graduate and undergraduate level
- To train students to apply bioengineering research to commercially viable problems[15]

Students interested in pursuing a Ph.D. in bioengineering must apply directly to the Ph.D. program. While some students enter with a master's degree, this is not a pre-requisite. There are five major milestones that must be completed in order to obtain the Ph.D.: coursework, the qualifying exam, the general exam, the dissertation and the final exam (dissertation defense). Although the course requirements have changed over time, the students that were interviewed were expected to complete 46 course credits; two of which were required courses. Students in this program were generally expected to complete their degree in five years.

[15] 2009-2010 Graduate Student Handbook, Department of Bioengineering.

In the department, there are eight key areas of study: Bioinstrumentation; Biomaterials and Tissue Engineering; Global Health and Distributed Diagnosis and Home Healthcare; Imaging and Image-Guided Therapy; Integrative Physiology, Systems Biology & Synthetic Biology; Molecular Bioengineering, Neural Engineering, Rehabilitation & Augmentation; and Understanding Nature through Engineering

*4.1.1 Funding of students*

The funding of doctoral students is presented here because prior research has shown how financial support contributes to the quality of students' experiences (Girves & Wemmerus, 1988; Nettles & Millett, 2006). During the first year of the Ph.D. program the department provides students with up to three quarters of funding to complete lab rotations and to ultimately choose a lab. Once a student has selected a lab, and has been accepted into a lab by the Principal Investigator (PI), the student will typically be awarded a research assistantship through the lab's research grant(s). A student's selection and admission into a lab group significantly determines the nature and focus of the student's thesis research project because their project must contribute to the goals of the research grant. Some students do enter the program with external fellowship support (e.g., NSF or NIH); however, they still need to find a lab to work in and an advisor who will support their work. In the few cases when funding was not available, students have to find other ways to fund their education (e.g., teaching assistantships[16] or student loans).

**4.2 Nature of research in bioengineering**

[16] For students that were admitted after the fall of 2006, a teaching experience or teaching assistantship is required. None of the students in this study had to meet this requirement.

The faculty and students interviewed were fairly consistent in their descriptions of the type of research that occurs in bioengineering. They said that bioengineering generally involves the application of engineering principles to resolve or improve biological functions. Even though faculty members and students were able to provide a general definition of bioengineering they also characterized it as an interdisciplinary field that looked at a wide range of research topics.

Early on in my interviews, I was surprised to learn that the faculty and students did not view the completion of the Ph.D. as an indication that someone had become an independent researcher. Both faculty and students saw doctoral education as the "beginning of the path towards independence." Many said that because doctoral students only worked in one laboratory and on one research project that they needed more experience with identifying problems and finding funding. They acknowledged that learning to do research was such a huge task that it could not be mastered in the few years that make up a graduate program. In bioengineering, as in many other science programs a post-doctoral appointment is viewed as the mechanism which ideally provides graduates with a "safe place" to learn about another research area, to learn new techniques, and to develop a personal research agenda (Committee on Science, Engineering, and Public Policy, 2000). Increasingly, postdoctoral research is being required of bioengineering graduates regardless of whether they want to go into academia or not (Thakor, 2008) while only 10% of engineering students pursue post-doctoral appointments (Nerad & Cerny, 1999).

*4.2.1 Skills needed to do research in bioengineering*

Faculty and students were asked what skills were needed to do research in bioengineering. Many of the skills that the faculty identified could be described as personality traits. For example, they said that students needed to be curious, inquisitive, creative, and organized in order to be successful in the field. In addition, they said that students needed to have comprehensive knowledge of the technical and non-technical aspects of the field. Once students had acquired this knowledge they would be more confident and "quick on their feet," which the faculty identified as very important. Another professor stressed that students also needed to learn how to collaborate with others. Finally, one professor identified public speaking and the ability to effectively communicate with others as a necessary skill.

The students provided a more comprehensive list of skills. To begin, they recognized that they needed to have general knowledge of the field followed by more in-depth knowledge of their topic. Second, depending on the type of research they were doing, they needed to have certain technical skills or what one student referred to as "hard skills." These technical skills might include knowing how to use a particular piece of equipment or knowing how to set up an experiment. Students also recognized they need to be analytical, critical, and to question everything.

The next set of skills that students identified centered on oral and written communication. In terms of oral communication skills, students said they needed to be able to talk about their work in front of a group, stand up for your work, take criticism, and be able to advocate for yourself. The students also recognized that you should be able to talk about your research to another scientist as well as a fifth grader, and have strong written communication skills. As one student said, being able to write successful grants is

one of the main mechanisms for selling your ideas to peers and funding agencies in order to support your research.

The student participants also discussed the importance of being able to work with others. One of the students said that he had heard his colleagues refer to this as "people skills" or "soft skills." Especially important was learning how to work in a team. A few students discussed the importance of learning how to leverage other people's skills. One student described these as "managerial skills" because it was his job to be the project manager of his research and he had to find other people to help him with different aspects of his work. He realized that it was impossible for him to master every single procedure necessary for his study and so he learned to seek help from others.

Finally, similar to the faculty, the students also identified several personality traits that they stated all doctoral students needed in order to do research in bioengineering. This included being curious, organized and having the ability to plan. One student also said you needed "tenacity" in order to keep plugging away at something that isn't working in order to eventually get to the point where it does. Another student found it critical to be able to see the big picture while simultaneously paying attention to the details of one's own research.

**4.3 Faculty members' comments**

In the following section I focus exclusively on the comments provided by the faculty members regarding the formal requirements and informal activities that they identified as preparing students to become independent researchers. Additionally, I present their opinion about the role of the advisor and apprenticeship relationships in preparing future researchers.

*4.3.1 Participation in a laboratory*

In the experimental sciences, the laboratory is the primary place of research production (Hofstein, & Lunetta, 1982). As a result, talking to the faculty member participants about the laboratory as the place where students learned to do research was stating the obvious. The faculty all viewed the lab as the primary place where students learned to do research and they said that they relied on other lab members (advanced graduate students, post-docs and research scientists) to help train their students. Faculty also talked about the importance of the lab meetings, which typically occurred several times a month, in bringing the group together to discuss the status of everyone's research. Faculty saw this formal meeting as an important learning opportunity for students especially when it was their turn to present their work and discuss their progress.

*4.3.2 Coursework*

As in every U.S. Ph.D. program, students are expected to complete a set amount of coursework (students admitted before 2006 were required to complete 46 credits, students admitted after 2006 were required to complete 33 credits). Among the faculty interviewed, they believed that the coursework provided students with a common integrated experience and an opportunity for students to learn the fundamentals of the field. They saw the coursework as a "common experience" where students could interact with their cohort and become familiar with each other's projects. In addition, the faculty also stressed how the core and required classes gave the students important foundational knowledge and a good understanding of the overall field of bioengineering, instrumentation, and biostatistics.

*4.3.3 Qualifying examination*

The qualifying examination is the first major milestone of the program for students. According to the most recent graduate student handbook, "The qualifying examination is the first test, after admission, of a Bioengineering student's potential for a successful career in original bioengineering research at the doctoral level." (Bioengineering Graduate Student Handbook, 2009-2010, p. 19). All students are expected to take the exam during their second year and the student's qualifying exam committee (distinct from their thesis committee) approves their questions. The exam is administered over a five-week period in which students are given an open-ended research question and are given four weeks to respond in the form of an NIH grant proposal. During the fifth week, students orally defend the proposal in front of their qualifying exam committee. Students have two opportunities to pass the exam and if they fail both times they must leave the program. The faculty I spoke to said this was not common.

Overall, the faculty saw the qualifying exam as an opportunity to see where each student was at and to help them develop their research skills. The faculty acknowledged that learning how to write a grant was fundamental to being a successful academic and the exam was valuable because it helped students to demonstrate grant writing skills, which they were initially taught in one of the core department courses. Furthermore, by having students study something slightly outside of their current research area they were also improving their ability to understand the field more broadly.

*4.3.4 General examination*

The general examination is the second milestone students are expected to complete.

> The General Examination is used to determine the soundness, significance, and originality of the student's research project [dissertation], as well as test the clarity

> and thoroughness of the student's understanding. It provides an opportunity for the student to justify his/her research vision, describe the initial experimental plan, and present preliminary data demonstrating feasibility of the project. (Bioengineering Graduate Student Handbook, 2009-2010, p. 22).

Unlike the qualifying exam, which is very structured, the general exam is much more free form. Although the department encourages students to take the exam as soon as possible, the faculty interviewed had different perspectives on when their students should complete the general exam. Some advisors had their students take their exam after they had collected some preliminary findings. Other advisors preferred for their students to have at least 1-2 papers published from their project (or 60-80% of their project completed) before taking their exam. My sense from the interviews was that faculty used the same approach with all of their students.

As a result, the overall purpose of the general exam differed depending on when an advisor expected their student to complete the exam. For those who believed in taking it earlier, the exam was an opportunity for students to get substantive input from their committee because students were still in the early stages of their research. For those who advocated for students to take the exam later on, the general exam served much more as a pre-thesis defense.

*4.3.5 Dissertation*

The faculty members did not have a lot to say about the dissertation. Only one professor made the observation that the dissertation was anticlimactic for his students because they had already published 2-3 articles from their dissertation research. Therefore, putting the dissertation together consisted of compiling those published

articles and writing an introduction and conclusion that ties them together. This professor said that the more significant challenge for his students was applying for grants to fund their research and publishing journal articles. The dissertation, as a result, was more of a formality.

*4.3.6 Teaching*

Another type of formal learning experience that the faculty identified as contributing to students' ability to do research was learning how to teach. In 2006 the Department of Bioengineering introduced the requirement that all doctoral students would complete at least one quarter as a teaching assistant for the department. One professor noted that the teaching assistantship would not only help prepare students to teach but it would teach them how to communicate more effectively with others. He stressed that the ability to communicate with others was a critical skill for researchers. However, due to the fact that all of the students interviewed in this study were admitted prior to 2006, none of these students had to complete this requirement.

*4.3.7 Informal Ph.D. activities*

The faculty members who participated in this study also discussed the value of several informal learning experiences. In fact, one professor said that he believed that the informal experiences were actually more important than the formal ones.

The most commonly discussed informal learning opportunity among the faculty was professional meetings. One professor said that the value of students presenting their work at national meetings was that they learned how effective they were at communicating their research to others. This was especially important because he found students became too comfortable presenting their research to their lab mates who, over

time, became very familiar with their work. An additional benefit of national meetings, from one professor's perspective, was that it was a place for students to develop a network of colleagues, which was critical toward their becoming an independent researcher.

Other valuable informal learning experiences identified by the faculty included: applying for research funding, being involved in journal clubs, and participating in outreach and service activities in K-12 schools.

*4.3.8 Role of the advisor*

The three faculty interviewed had different views on what their role was as an advisor. One professor talked about how he did things like talk to his students about their classes, got them started on a project in his lab based on their interests, and gave them feedback on their work. While this professor would regularly meet and guide his students, he also relied heavily on others in the lab to teach his students the things they needed to know in order to get their research done.

Another professor said that his primary goal with students included teaching them how to do "good" and "successful" research, helping them develop as many skills as necessary to start on their path toward independence, teaching them how to write and communicate effectively, teaching them how to work with others and still be able to work on their own, and ultimately teaching them what it means to be successful. As an advisor he facilitated his students' learning by creating experiences and opportunities for his students in the lab that would allow them to develop these skills. For example, he required all of his students to work in teams so that they would learn how to collaborate

with others. He also had students regularly present their work at lab meetings so that they would gain confidence and acquire strong communication skills.

The third professor described himself less as an advisor and more as a colleague or collaborator with his students. He said that as a more experienced scholar, he expected his students to bounce their ideas off of him. He regularly asked students questions about their work to help them to anticipate similar questions in the future. For example, he would ask them, "What happens if you don't get positive results?" In this way he would get students to think about plan B. By doing this he believed he was helping his students learn the skills needed to have careers as independent researchers.

*4.3.9 Apprenticeship relationships*

Faculty participants were directly asked about their experience with the apprenticeship model. From the faculty's perspective, they viewed doctoral students as "beginning" apprentices that had started during their undergraduate years and would continue through their first academic appointment and beyond. The faculty observed that their department provided a "diffusive learning environment" where information and resources were spread out and so one of the key ways that students learned how to do research was through the apprenticeship model. However, they did not characterize it as a "solo apprenticeship" with just one professor but as a "group apprenticeship," primarily in the lab, and with lots of different people.

**4.4 Students' comments**

In the following section I focus exclusively on the comments provided by the student candidates regarding the specific types of activities and experiences that contributed to their learning how to do research in bioengineering and whom they learned

from. In addition to identifying the activities and experiences that contributed to students' learning, I also identify examples of cognitive apprenticeship tools (Collins, 2006), as described in Chapter two.

*4.4.1 Participation in a laboratory (formal)*

The central location of a doctoral student's educational experience in bioengineering is in a laboratory. As a member of a lab, doctoral students are participants in a larger research project under the leadership of a professor. By becoming a part of a professor's laboratory the student is expected to contribute to the larger research project and create a thesis project from that work.

Each lab composition is unique and, depending on the size of the lab, could include any combination of the following individuals: research scientists, lecturers, post-docs, graduate students and undergraduate students. All of the students interviewed said that a lot of how they learned to do research occurred in the lab and was facilitated by other lab members. Students said that their lab mates taught them how to use different equipment, how to conduct different protocols, and how to look for things on a database. One student said that while her interactions with others were brief, they helped teach her what she needed to look out for and what she needed to improve on *(modeling)*. The amount learned from lab mates was significant for these students. One student joked that a post-doc in her lab had helped her so much with her thesis that he should technically be her advisor.

Lab meetings, which took place monthly or bi-monthly, also served as valuable learning opportunities for students. During these meetings, lab members would discuss relevant literature, check-in about the status of everyone's work and give each other

feedback. Several of the students referred to the lab meetings as particularly useful, especially when it was their turn to present their work (*articulation)*. One student said that one's ability to design experiments and critically analyze research comes only after repeatedly presenting research to lab mates and having them "tear it apart." Another student said that he had learned how to handle conflicts by watching his advisor mediate disagreements amongst lab members.

The students provided some insight into what made the lab such a valuable site for learning how to do research. First, the students found that there were many opportunities to have informal interactions with others in the lab. One student said that being in the lab allowed her to get her lab mates' opinions in a "non-structured," "non-threatening," and "non-critical" way. In other words, the lab allowed for casual conversations to take place and students often found the feedback they received more constructive than the feedback they received during meetings with their advisors or during formal presentations in lab meetings. They found there was something in the casualness of these interactions that allowed them to think more creatively about their work.

Another benefit of the lab environment was that it gave students the opportunity to observe others. Given the technical nature of research in bioengineering, the students said that one of the key ways they learned how to use certain pieces of equipment and do certain procedures was by observing others (*modeling, coaching)*. Additionally, students described that by observing others they were also able to gauge their own progress. Several of the students noted that in the lab environment there was always someone to compare yourself to which provided ongoing opportunities to reflect on your own

progress. One student described it as "monkey-see, monkey-do" where by watching everyone else she was able to figure out what she needed to do. For these students, watching others "succeed" or "fail" was a valuable way of learning what they needed to do *(reflection)*.

One student discussed how he learned about lab management and mentoring because these things were missing from his lab. When he first arrived at his lab he was not introduced to any of his lab mates and he did not receive any resources or guidance. As a result, his first few months in the lab were very frustrating because he did not know what he was doing or how to make progress. Because of this experience, he has since taken it upon himself to mentor incoming students and develop a website to serve as a central repository of information for the lab.

*4.4.2 Coursework (formal)*

Students generally agreed with the faculty that their courses gave them an understanding of the field of bioengineering and provided them with general content knowledge. Through their coursework they learned about the basic concepts in bioengineering, which helped them to be more comfortable in the field. In addition, they gained the confidence to be able to communicate with other people in their department. Some of the students said that they appreciated the opportunity to gain a general foundation of knowledge before having to specialize in a specific area.

Students also reported that they benefited from the skills they acquired from various class assignments. For example, in one of the required classes, students had to write a mini-grant. Two students observed that through this assignment they learned how to work with primary literature, identify relevant databases, and integrate knowledge.

Completing this assignment also helped prepare students for their qualifying exam because it taught them how to write a research grant (*scaffolding, coaching).*

*4.4.3 Qualifying examination (formal)*

Overall, the students found the qualifying exam to be a useful and even "fun" experience. Several of the students said that through the exam they learned more about how to write a grant proposal (*modeling, articulation, exploration).* Specifically, they learned things like how to look up references and how to build a good argument based on the literature. Because students were required to write a grant proposal on a topic that they didn't know a lot about, it also boosted their confidence in their ability to write a grant proposal from scratch in a short amount of time. One of the students said that the qualifying exam was the first opportunity she had to "put herself out on the line," and put something together that was completely her own. Many of the students talked about how later in their program they had gone on to write their own research grants, manuscripts and fellowship applications and the qualifying exam helped them to complete all of those tasks.

*4.4.4 General examination (formal)*

The general exam in the Bioengineering Department was much less structured than the qualifying exam because advisors and committee members administered it. There was significant variation in when students took the exam, what they had to complete beforehand, and what the exam consisted of. As a result, students had different experiences and expectations regarding the general exam.

Each general exam required some combination of a written project and an oral defense. The following are different examples of what some of the students were required

to complete for their exam: (1) Four dissertation chapters including two published manuscripts, a book chapter, and a fellowship proposal, (2) an NIH grant proposal, and (3) a thesis draft (*coaching, modeling)*. Of the seven student participants, four of them were required to publish a paper on their research before completing their general exam. For these students, this required having completed 70-80% of their research, which usually put students within one year of graduating. The remaining three students took the exam earlier on in their research, around their third year in the program.

While all of the students found the exam to be useful, it was useful in different ways depending on the timing and requirements. For students who took the exam during the earlier stages of their research the biggest benefit was that they received feedback from their committee, which they were able to integrate into their research project. One student observed that his general exam was his first opportunity to present "what the end of the road looked like" and to see what his committee thought about it. Another student similarly found it valuable to lay out his thinking of how he was going to accomplish his project. He said the interaction with his committee members had been really positive and he walked away feeling good about his relationship with his committee and good about his progress.

For the students who took their general exam towards the end of their research project the process seemed less valuable in shaping or helping them with their research. Instead it served as a pre-thesis defense (*scaffolding)* which made one student much more confident going into his final defense. This same student commented that the general exam was the first time he was "allowed to have an opinion" because he was seen as being an expert on his topic. For another student, she found the general exam to be useful

in signaling to her advisor that she was close to being done.

In addition to the formal program requirements, students identified additional activities, or informal activities, that contributed to their learning of how to do research in bioengineering. While the laboratory was the primary site of learning there were two additional activities that students identified as helpful in their development as researchers.

*4.4.5 Professional conferences (informal)*

The first of these was professional conferences. Some of the students discussed how conferences gave them an opportunity to get a sense of what other researchers were doing (*modeling, reflection)*, what others were excited about, and to learn about hot topics in the field. Presenting at a conference (*articulation)* also gave them the opportunity to get broader feedback on their work and get advice on how they should be doing it.

*4.4.6 Department seminars (informal)*

Another activity identified by the students was seminars in the department and across the college. Going to these seminars gave students another opportunity to observe other scholars and learn not only about their research but also how to present. One student said that going to department seminars was a good opportunity to learn how others "do research" showing him the types of things he needed to do in order to become an independent researcher. Another student said that going to presentations by "famous people" motivated him to work harder in order to become an independent researcher like them (*modeling, reflection).*

*4.4.7 Master's degrees (informal)*

Of the seven students interviewed, three came in with a master's degree from another institution. Those students regularly discussed the role that their earlier educational experience played in their learning how to do research. For example, one student said that she believed she was able to survive the "sink or swim" environment of the Ph.D. program because she had learned so many research skills in her master's program. In her master's program she had also learned how to cope with the frustrating periods of research. Another student also discussed how he had found that the Ph.D. experience was enhancing many of the skills that he learned in his MS program. So for example, although he had experience with formulating a research question and designing a research project he had to do it in much more detail as a doctoral student.

*4.4.8 Industry experience (informal)*

Two of the students interviewed had experience in industry and both students discussed how those experiences had helped in their development as researchers. One student said that at the beginning of the Ph.D. program he realized that he already had many skills, which made him more confident and comfortable in the academic setting. In particular, he had already acquired a general base level of understanding of the research process. He also had extensive presentation experience, a skill he has continued to apply and refine. Another student talked about how during a recent internship experience at a consulting firm he found a theoretical framework, which he was able to apply to his dissertation research project. He said that it had a significant impact on how he had been thinking about his research.

*4.4.9 Advisors/Committee members*

While each student described having a unique relationship with his/her advisor there was one common thing that students learned from their advisors – how to develop their conceptual skills and be aware of the "big picture." Namely, this involved pushing students to understand the position and place of their work within the larger context of the field. Students said that they ultimately came to rely on their advisors to help them with the conceptual aspects of their research because this was their advisor's greatest strength. Students said that their advisors asked good questions that forced them to step back from their research, to look at it from a different angle, and ultimately see it within a larger context. In contrast, students said that their advisors were less helpful with the day-to-day details of their research. While students individually provided other examples of what they had learned from their advisors (e.g., presentation skills, writing skills), the common contribution of their advisors was teaching them how to think about their research conceptually (*coaching).*

An interesting observation made by many of the students in the program was the style of teaching used by their advisors and committee members. What they described could best be defined as indirect or implicit teaching (*articulation).* This implicit style of teaching required students to have a more heightened awareness in order to be able to recognize that professors were teaching them indirectly through their questioning and their critiques. For example, one student said that her advisor and committee members would never tell her, "you need to work on x, y and z." Instead, they would ask her questions about her work and expect that she had anticipated these questions. In this way they helped her develop her critical thinking skills and helped her learn what she should be focused on. Another student described her committee regularly pushing him out of his

comfort zone by the types of questions that they asked of his research. He said that through their questioning and focused critique he learned what to pay attention to. In other words, this student described learning more from what not said than from what was said.

*4.4.10 Peers*

While a lot of students' peer interactions occurred in the lab the students also found casual conversations outside of the lab, in the hallways or at happy hour to be equally valuable to their research. One student said that you always learned things when you talked to other students about research. Another student said that learning about what her peers were doing and how they were solving problems indirectly informed her own research (*modeling).* Another student said that when he talked about his research with other students he often found holes in his research (*articulation, reflection).* He observed that over time those in his lab had become pretty familiar with his research and so talking to someone outside of his lab provided a fresh perspective, which resulted in different types of questions.

*4.4.11 Independent learning*

Many of the students in bioengineering talked about the amount of independent learning they had to do. During their doctoral education, some of the students realized that they didn't have to be passive in the learning process but instead should be active and seek out information on their own (*exploration).* This was largely directed through their interactions with faculty who might give them a book to read or direct them to talk to other faculty, etc. For other students, it wasn't so much directed by their advisor but rather because they found that they didn't have as much support from their advisor or

committee members and as a result had to figure things out on their own. One student shared how over time she realized that if she had a question she should just go and look it up by herself. By doing this, not only did she learn things on her own, but she also became more confident in her ability to do independent research.

One of the benefits of independent learning identified by one of the students was that after a while you were able to discern what types of things you would be able to figure out on your own and what you might need help with. While many of the students looked to their advisor and other faculty members as examples of successful researchers, they realized that ultimately they had to find their own "personal process" or way of doing research. For example, one student said that, while he would often bounce ideas off of his advisor, he was the driving force behind his project and he had to take responsibility for it.

*4.4.12 Apprenticeship relationships*

Among the students interviewed, the majority of them agreed that they had learned how to do research through apprenticeships. Similar to the faculty, they acknowledged that it occurred mostly in the lab and with multiple individuals, not just their advisor. Another distinction that some of the students made was that, although they engaged in apprenticeship relationships with different people, these were generally "short-term." For example, one student said that one week you might be an apprentice with one person and the next week you might jump over and work with someone else. At the same time it was possible that you were a mentor for somebody else at the same time. Another student described her apprenticeships as short bursts of interactions and another

student said that he had "apprenticeship type moments" with certain individuals in his lab.

The students not only differentiated their apprenticeships in terms of duration, but they also discussed how they focused on different topics with different people. For example, one student said that the primary focus of his apprenticeship with his advisor was on his writing and conceptual thinking. This student found that during his interactions with his advisor and committee members their conversations often focused on the conceptual issues of his project. Because of this, he defined these interactions as more "thinking apprenticeships." In contrast, he described his interactions with lab mates as focused on the day-to-day details of his research which he described as a "doing apprenticeship."

Overall, students acknowledged that they had experienced some form of apprenticeship during their Ph.D. but they were nuanced about the type of apprenticeship relationships they had experienced and with whom. The students described their apprenticeship relationships as typically short-term (apprenticeship moments), varying by type (thinking vs. doing), and as occurring with multiple individuals (advisor, committee members, lab mates, and peers).

**4.5 Discussion-Apprenticeship model in the Bioengineering Department**

Both the faculty and student participants from the Bioengineering Department at State University supported the existence of apprenticeships in their program. However, they rejected the notion that apprenticeship relationships existed only between an advisor (master) and student (apprentice), as suggested in the traditional apprenticeship model (U.S. Department of Labor, 2008). Instead, the faculty and students acknowledged that

apprenticeship relationships occurred with multiple mentors resulting in what they described as a "group apprenticeship," similar to Lave & Wenger's (1991) conceptualization of communities of practice. The students also rejected the traditional apprenticeship model on the basis that their apprenticeships were not long-term, but rather short-term apprenticeship moments. And even though they had long-term relationships with their advisors, there were only certain instances that they characterized as apprenticeship moments.

The interview data showed that faculty and students in the Bioengineering Department were all engaged in the domain of bioengineering and doing research that applied engineering principles to biological problems. However, because faculty and students were often clustered into smaller research communities through their participation in different lab groups, lab groups served as a primary community of practice in the Bioengineering Department.

*4.5.1 Community of practice*

Wenger (1998) defined a community of practice as comprised of people who are mutually engaged, have a joint negotiated enterprise and a shared repertoire (i.e. routines, tools, ways of doing things, etc.). Although the types of collaborative relationships varied, many of the students provided examples of mutual engagement within their lab groups. One of the mechanisms that seemed to help keep lab members mutually engaged was attending regular lab meetings. During these meetings lab members might give updates on their research or talk about relevant literature. The students also provided examples of cases when they collaborated with lab members on their research or publications, which helped to build relationships with others in the group.

A second feature of a community of practice is a shared understanding and negotiation of what binds the group together in a joint enterprise. During the interviews, two variables emerged which seemed to influence the degree to which the students found the lab's research activities to be a joint enterprise. The first variable was the organization of the lab group. One student said that there were two types of lab groups: (1) one where everyone produced data that fit into a bigger project and (2) one where lab members worked independently. Another variable that seemed to impact the extent to which a lab was a joint enterprise had to do with how active the PI was in the day-to-day activities of the lab. For example, one of the faculty members interviewed said that the only time he was in the lab was to attend lab meetings. In contrast, another student reported that her advisor was always in the lab doing everything from running her own experiments to working with others.

These two variables seemed to have different impacts on the degree to which lab activities were perceived as a joint enterprise. For example, one student said that, even though she had a lot of freedom in her day-to-day activities, she still had only a "low level of creativity" around her research. This student was in a lab group where research projects were closely related, which resulted in her project being largely pre-defined. Another student said he was pretty much on his own with his work because he was in a more independent lab group. Even though there was variation in the dynamics of each lab, there was still some degree of negotiation around the research enterprise, even if the negotiation was that lab members would work independently. While the scope of a lab's research was determined by the PI who secured the research funding, it was ultimately the graduate students, the post-docs, the research scientists and others who were

responsible for implementing the science. In order for this to be accomplished, there had to be some amount of joint negotiation and ongoing communication and leadership.

The final feature of a community of practice is the existence of a shared repertoire or a set of communal resources that are used to pursue the joint enterprise. Some of the faculty and student interviews illustrated a shared practice in the lab. Even if there was variation in how closely lab members were working together, the lab groups had developed a shared repertoire and a method for sharing resources that allowed everyone to accomplish their research. One example of this was seen in one student's description of expertise in her lab. She said that each lab member, including herself, would become the "expert" on a particular technique or piece of equipment and would then be responsible for teaching it to others. This lab was able to maintain a shared way of doing things by having one person take responsibility for teaching everyone else. Another student who came in with her own funding said that becoming part of a lab and embedding her work into another project was critical for her because it provided her with a support network, supplies and equipment. For this student, the lab group not only provided her with access to communal resources but, it also gave her a repertoire that she could learn from and share with others.

Lave & Wenger (1991) showed that within a community of practice individuals moved from the periphery of the community to the center of that community through apprenticeship relationships with others. Multiple students illustrated their transition to the center of their community. For example, one student talked about becoming the "expert" on a particular technique and having to teach it to others. Another student shared

how he basically became an informal lab manager and then took it upon himself to mentor new lab members and organized important lab documents.

Overall, there was substantial evidence from the Department of Bioengineering to show that the majority of the lab groups were communities of practice. The one exception was a lab group that had largely dissolved due to an end of funding. For the student in this lab, he no longer had an immediate community of practice, although he did continue to work with his colleagues informally. While there was evidence of other communities of practice (e.g., student groups and professional associations) the faculty and students primarily focused on the lab as the primary site for apprenticeship relationships.

*4.5.2 Apprenticeship types*

The second feature in the conceptual framework of this study differentiates between different types of apprenticeships (Sullivan, et al., 2007). Interestingly, one of the things that emerged from the bioengineering data was the existence of two different types of apprenticeships: thinking and doing. The students said that the majority of their interactions with their advisors and committee members focused on "conceptual" or "big picture" issues. In contrast, students found apprenticeships with their lab mates (peers, research scientists, and post-docs) typically focused on learning how to use specific tools, techniques, or procedures. One of the things that led to this differentiation was a direct result of who students interacted with on a day-to-day basis. Since students regularly worked in the lab they had to depend on others to teach them, or at the very least guide them to the appropriate resource. Since faculty advisors were not commonly present in the lab, students had to rely on their lab mates. At the same time the students did regularly meet with their advisor and committee members on a more formal basis and

there they had more of an opportunity to step back from their work and tackle larger issues such as their conceptual frameworks or how their research was situated in the literature. Overall, the differentiation of apprenticeship types seemed intuitive and natural for the students. Interestingly, the designation of types was similar to two of the apprenticeship types identified by Sullivan et.al (2007) in professional education: intellectual or cognitive and skills-based.

*4.5.3 Cognitive apprenticeship tools*

The third and final feature of the conceptual framework in this study focuses on the utilization of cognitive apprenticeship tools to facilitate apprenticeship interactions. In the Bioengineering Department there was significant evidence of cognitive apprenticeship teaching methods (Collins, 2006) being used both within apprenticeship relationships and beyond. The students primarily described learning from their advisors, committee members, other professors, post-docs, research scientists, and their peers. One of the most prominent teaching methods used was *modeling* in which the student observed an expert perform a particular task. While this most commonly occurred in the laboratory, the students also described watching and learning from presenters at department seminars and conferences. Modeling was also evident in the classroom, especially on activities like the mini-grant proposal which ultimately prepared students for their qualifying exam.

*Coaching,* or bringing a student's performance close to that of an expert was most evident in the lab and through the feedback students received on class assignments and on their general exam. The teaching method of *articulation* was particularly evident every time a student had to describe their research to others at lab meetings, conferences,

informal interactions with peers, etc. In doing so, the students had to explicitly state their knowledge, reasoning and problem solving processes. Hearing others present their research, either at department seminars, conferences, lab meetings or elsewhere, also provided the opportunity for *reflection* where students could compare their own problem solving processes with those of an expert or more advanced student.

One of the best examples of *scaffolding*, helping students carry out increasingly more complicated tasks, was the "mini-qual" assignment where students were able to practice writing a grant proposal before completing their qualifying exam. *Exploration*, or guiding students to be able to problem solve on their own was evident through the implicit or indirect teaching that advisors and committee members would use to get students to problem solve on their own especially around their dissertation research.

In sum, there is a significant amount of evidence to suggest that much of how students learned how to do research in the Department of Bioengineering was facilitated by apprenticeship relationships. In relation to the conceptual framework, the apprenticeship model in the Bioengineering Department could be represented in the following manner:

Table 10

*Apprenticeship Model in the Department of Bioengineering*

| | |
|---|---|
| Continuum of apprenticeship relationships | Apprenticeships occur with multiple individuals or in a "group apprenticeship." Primary example of a community of practice site in bioengineering is the laboratory. |
| Apprenticeship types | Apprenticeships described as "short-term" and as "apprenticeship moments." Difference between "doing" and "thinking" apprenticeships. "Thinking" apprenticeships are more common with faculty while "doing" apprenticeships are more common with lab mates and peers. |
| Cognitive apprenticeship tools | Cognitive apprenticeship tools mediate apprenticeship relationships:<br>• *Modeling*-Observations of others in a lab, at department seminars and professional conferences, mini-grant proposal<br>• *Coaching*-Feedback in laboratory and on class assignments<br>• *Scaffolding*-Mini-grant proposal<br>• *Articulation*-Presenting research in lab meetings, conferences and informal interactions<br>• *Reflection*-Hearing others present research at lab meetings, department seminars, conferences<br>• *Exploration*-Dissertation research |

*4.5.4 Other observations*

One of the more surprising findings from the Department of Bioengineering was the viewpoints around doctoral education and the production of independent researchers.

In general, the fundamental purpose of the Ph.D. is seen as the preparation of independent researchers (Association of American Universities, 1998; Council of Graduate Schools, 1990) and yet all of the faculty members and doctoral candidates interviewed viewed Ph.D. graduates as merely on their way towards becoming independent researchers in bioengineering. Nerad and Cerny (1999) found that in biochemistry the postdoctoral experience has become the proving ground for intellectual independence. This has interesting implications for the educational function of doctoral education and the post-doctoral experience in bioengineering. Whether or not this is the case for all bio-sciences is unclear, but it does raise some interesting questions about what impact, if any, this might have on the Ph.D. Have there been changes in the pedagogy of the Ph.D. in the lab-based sciences so that the post-doctoral appointment has had to become a necessary training experience? Furthermore, what are the implications for the majority of students in this study who are not planning on pursuing a post-doc and instead seek careers in industry? What are the major differences between bioengineering and other disciplines that would impact whether or not Ph.D. graduates are viewed as independent researchers?

Another thing that I found interesting was that, among the seven students that I interviewed, only one student said they wanted to pursue a faculty position at a college or university. The majority of the students were planning to pursue careers outside of academia throughout their doctoral studies. This is similar to what other researchers (Golde & Dore, 2001; Nerad & Cerny, 1999) have found in that students in disciplines strongly connected to industry are often less interested in faculty careers than students in other disciplines. Although I can't fully speak to the extent to which their career goals

may have impacted their experiences around becoming researchers in the field, there were some notable differences between these students and from the student in the other two departments.

For example, several of the students talked about participating in student organizations that helped promote and support students who were interested in non-academic careers. There was one organization that many of the students mentioned because it regularly brought in speakers from industry to help describe the type of work being done. In addition, two of the students interviewed completed a certificate program offered by the business school, which focused on the development and commercialization of new technologies. So while students were engaged in becoming researchers and learning the skills and tools that would make them successful in bioengineering, the majority of them were also engaging in activities and experiences that were preparing them for careers in industry.

**4.6 Summary**

In the Department of Bioengineering, the primary community of practice in which the doctoral students learned how to do research was individual laboratories. Within these communities, doctoral students interacted with a variety of individuals through short-term apprenticeship moments, that either focused on specific skill acquisition ("doing apprenticeship") or larger conceptual issues ("thinking apprenticeship") in relation to their dissertation research. "Doing apprenticeships" more commonly occurred with lab mates while "thinking apprenticeships" were more commonly facilitated by advisors and committee members. Finally, individual cognitive apprenticeship tools mediated students' learning primarily through individual department-based activities.

# Chapter 5

# DEPARTMENT OF COMPARATIVE LITERATURE

*Graduate education is being self-directed on the basis of these things that are not teachable, they're competencies, and we don't know where it comes from.*

-Comparative literature faculty member

*There is hardly any modeling of things. They'll say here's this enormous difficult thing you have to do and we will help you minimally in figuring it out. But you're basically on your own.*

-Comparative literature doctoral candidate

## 5.1 Comparative literature at State University

The Department of Comparative Literature at State University defines itself as "working across national and regional boundaries to explore the relationships among multiple literary traditions, and the connections of literature to other arts and fields of knowledge" (Department of Comparative Literature Website). In its most recent Self-Study report (2002), the department acknowledged that the field of comparative literature "will continue to be defined less as a distinct discipline than as a place for working through the connections within and across disciplinary fields of study." At the time of the study, the department had over 20 core faculty and over 40 enrolled graduate students.

Over the last ten years (1999-2009) the department has awarded, on average, 4.3 Ph.D.s a year (State University Graduate School website). The department offers programs in Criticism and Theory and Textual Studies and "places primary emphasis on scholarship and research as preparation for teaching at the university or college level in comparative and world literature, as well as in the language and literature of the student's

specialization" (Department of Comparative Literature Website). The key areas of study in the department include: Comparative World Cinema; Asian Film and Literature; 19th Century German, British and American literature; Latin American Literature and Film; and Criticism and Theory and Textual Studies.

Students interested in pursuing a Ph.D. in Comparative Literature are required to apply directly to the program regardless of whether they have a master's degree or not. If they do not come in with a master's degree they are typically awarded one at the end of the second year and then must re-apply to the Ph.D. program. When students enter the program they are not automatically assigned a faculty advisor. Students generally work with a graduate student advisor, an administrator in the department, until they formally select their advisor or chair of their committee. This usually happens at the same time that students select their entire committee; two to three years into the program. Because of the significant role that the graduate student advisor plays at the beginning of students' careers one faculty member described this person as the "glue that holds the department together."

There are five major milestones that must be completed in order to obtain the Ph.D. in this program: coursework, language requirement, general exam, prospectus and the dissertation. Students were expected to complete 50 credits beyond the master's degree and do so within five to six years.

*5.1.1 Funding of students*

The funding of doctoral students is presented here because prior research has shown how financial support contributes to the quality of students' experiences (Girves & Wemmerus, 1988; Nettles & Millett, 2006). Over the past several years the Department

of Comparative Literature has been able to guarantee five years of funding to all of its doctoral students. One of the ways they have been able to achieve this is by "farming" out their students to fill Teaching Assistantships (TAships) in other language programs across the university. The majority of doctoral students are funded by TAships throughout their tenure as students. The following table provides a breakdown of the different funding sources for the seven doctoral candidates that I interviewed. Pseudonyms were used for each of the students.

Table 11

*Comparative Literature Students' Funding Over the Tenure of Their Program*

| Name | TA in the department | TA outside department | RA in the department | Fellowships | Teaching at other | Other on-campus |
|---|---|---|---|---|---|---|
| Evan | | X | | X | | |
| Grace | X | X | X | | | |
| James | | X | | | | X |
| Kaylee | X | X | | | | |
| Lily | X | X | | | | |
| Logan | | X | | | | |
| Zach | | X | | | X | X |

The faculty members recognized that the department's reliance on TAships did have significant implications for students' learning experiences. On the one hand, the faculty acknowledged that their students received excellent teaching preparation in comparison to students at other institutions whose funding was not exclusively through

teaching assistantships. In addition, because students had appointments in several different departments, including comparative literature, they were also getting a broad range of teaching experiences and had lots of opportunities to make connections with other people. On the other hand, one professor openly admitted that the Department of Comparative Literature was exploiting the labor of its students who were just "barely prepared" to teach classes that should otherwise be taught by full-time faculty. Faculty commented that teaching often consumed a lot of students' time and in many cases interfered with students' being able to connect with their cohort. Another professor said that teaching distracted many of the students because they enjoyed it so much since it provided immediate feedback, making it "seductive." The faculty members reported that students' teaching responsibilities often interfered with their overall progress in the program and with the timely completion of their dissertations.

Another significant consequence of students having teaching appointments in non-comparative literature departments is that it spread students out across the university. With teaching appointments in other departments, students' offices and daily activities primarily took them outside of the Department of Comparative Literature. Many of the students described having a "loose affiliation" with the Department of Comparative Literature as a result of not being regularly around.

**5.2 Nature of research in comparative literature**

The question as to what is the nature of research in comparative literature immediately posed a challenge in semantics. As one professor explained, the term "research" did not apply to comparative literature. What he and his colleagues engaged in was best described as "advanced work." Many of the students agreed with this and said

that they defined "research" as going to the library, gathering texts, or activities that were directly related to searching for sources. In other words, the act of "research" was independent from reviewing texts, generating questions and building an argument.

According to the faculty members and students interviewed, advanced work[17] in comparative literature revolves around a very wide definition of "texts." A major premise of the field is that every national literature is part of a broader historical or cultural process and the way that nations often interact with each other is often captured in the texts that emerge within and across nations. Advanced work in comparative literature begins with a text and the generation of an "interesting" question leading to an original idea. Once that original idea has been identified, scholars must spend a lot of time reading what others have said, and as one student said, "...in hopes that nobody has already expressed that idea." Once the idea is situated within the works of others, scholars make their own contribution by expressing their idea, making an argument, providing evidence and citing the appropriate theorists. In other words, the basis for study is mostly intellectual speculation, interpretation, and examination of fairly large and broad questions within the framework of theories and related previous writing.

Those who study comparative literature generally approach texts in two major ways. The first is by interpreting the work: starting from the text and dissecting it very precisely looking at every word, paragraph, and structure of the work. The second approach is more of a historical cultural analysis in which the scholar takes into account the conditions under which the text was produced by looking at what the author and other authors were writing about at the same time.

[17] Advanced work will be used in the remainder of this study to capture the scholarship and research conducted in the Department of Comparative Literature at West Coast University.

One student metaphorically described the field of literature as a collection of small islands that are located in the same region and which share the same current of water. However, while each island is geographically related it still remains independent of the other islands indicating the loose connections across comparative literature scholarship and the independent nature of advanced work. The independent nature of comparative literature was what many of the students seemed to appreciate most about the field. Generally, they had a lot of flexibility to define their study and pursue their interests. And because of the importance of the "original idea" and the countless possible combinations of national literatures, time periods and analytical lenses, students found it alluring that they could have a bunch of ideas in the air at one time and be able to think about the horizontal connections between them all.

*5.2.1 Skills needed to do advanced work in comparative literature*

Faculty and students were asked what skills were needed to do advanced work in comparative literature. Several of the things that both the students and faculty members identified were personality traits. For example, they mentioned the importance of being smart, being able to acquire knowledge on your own, being self-directed, and being able to ask for help. The students also added the importance of being social, asking questions, being assertive and reaching out to others. One student said that the very foundation of the humanities relied on human contact, although he admitted that at times it could be humiliating to seek others out and ask for help, it was necessary in order to be successful.

Another thing that was mentioned as critical for success in the field of comparative literature was the need to be interdisciplinary and to learn what is going on in other fields. At the same time, while the faculty agreed that students should take

advantage of all of the opportunities available to them, they also had to remain "clear headed" and "focused" and not "spread themselves too thin."

In terms of explicit skills both faculty and students highlighted the following:

- Research or archival skills-being able to distinguish credible sources and manage and organize sources
- Reading skills
- Writing skills-especially the ability to revise your own work
- Language skills

Some disagreement emerged between the faculty and the students regarding the role of the department in teaching students these skills. One professor said the following:

> ...By the time somebody gets to the point of deciding that they're going to apply for a Ph.D. in comparative literature they're miles and miles past the question of skills. They're already really, really good, and what we're looking at is how do we refine a competence.

The faculty largely agreed that the program was not the place to acquire the skills mentioned above, but rather it was the place to refine them. In other words, the faculty believed that students should come into the Ph.D. program with many of these skills partially developed. The one area where the faculty did see a need for more skill building was around mastery of language.

The students on the other hand had a different understanding of the program's role in teaching them certain skills. One student argued that he was expected to know how to do things that he had never needed to do before. One example he gave was figuring out which journals he should approach to publish his work. Several students

reiterated this, saying that there were many things they had to learn from scratch, like how to organize their sources and synthesize massive amounts of information. Instead of sharing strategies many students found that they had to figure these things on their own. One student criticized the program arguing that many of the skills that were needed to do advanced work in comparative literature were often overlooked and not explicitly taught. He shared how, at the beginning of their program (approximately year one to three) students were encouraged to spend most of their time reading as many books as possible and synthesizing these ideas. By the time he reached the dissertation stage he had no clue how to write a 250-page document because no one had ever taught him how to "develop an idea" and "how to go about attacking it." There was a clear tension between the faculty's perception of the Ph.D. program as the place where skills are refined and students' desire for more explicit skill development.

*5.2.2 Job market*

One major concern that emerged during all of the interviews was the current state of the job market in the field of comparative literature. In terms of career goals, two of the students had already secured employment as assistant professors and the remaining five students were all seeking faculty appointments upon graduation. Only one student also expressed interest in a research position. Because faculty and students were primarily focused on academic jobs they were very much aware of how students' activities had real consequences on their future competitiveness. For example, the students regularly talked about their dissertations and their teaching experiences in terms of how they would market themselves and how a hiring committee would perceive them.

The predominance of teaching assistantships in non-comparative literature programs was also a real concern for both faculty and students. Many of the students expressed a desire to teach more in the comparative literature program but found there weren't enough teaching assistantships in the program for everyone. As a result, although all of the students hoped to find appointments in a department of comparative literature, many of them realized that they would have to expand their search to include appointments in their national language literature (e.g., French, German).

**5.3 Faculty members' comments**

In the following section I focus exclusively on the comments provided by the faculty members regarding the activities and experiences that they identified as preparing students to become independent researchers. Additionally, I present their opinion about the role of the advisor and apprenticeship relationships in preparing future researchers.

*5.3.1 Coursework (formal)*

Students take approximately a third of their courses within the department and two-thirds in individual language and literature departments. Many of these classes are cross-listed between comparative literature and other departments because of the large number of faculty that have joint appointments in other departments. The faculty participants generally viewed coursework as a way to teach students the theory and tools for doing advanced work, to connect students with their department cohort and peers, and to facilitate formal and informal networks.

*5.3.2 Language requirement (formal)*

Prior to completing the general exam, students are expected to have advanced reading knowledge in two languages other than English and a basic reading knowledge of

a third language. The language competence is assessed either through an exam or through the successful completion of a certain number of courses in that language. In order to achieve this, students are expected to be linguistically capable in at least two languages at the time they are admitted into the program. Some of the faculty commented that the students that seemed to struggle with this requirement the most were those for whom English was not their first language. Faculty also commented on how the language requirement appeared to be more difficult for students who were pursuing Asian languages as opposed to those who were learning romance-based languages which are much more similar.

*5.3.3 General examination (formal)*

The general exam is typically scheduled one quarter after a student has completed their coursework; approximately around the student's fourth or fifth year or after 90 course and language credits have been completed. Students are expected to select a supervisory committee at the end of their first year in the doctoral program who will oversee their general exam. Students generally spend one quarter preparing for the exams (i.e. developing reading lists and reading), and then they complete the written examinations in three general areas: (1) a period exam in the student's primary national literature, (2) a comparative literature exam, and (3) a comparative theory exam. They have one day to respond to each question and typically students answer one question a week. During the fourth week, students have their oral comprehensive examination which faculty say is designed to evaluate a student's preparation for dissertation work.

The faculty described the general examination as an important "rite of passage" that helps provide a common structure for all students. Faculty recognized that after the

completion of coursework students need a focused goal and the general exam helps students to move forward by ensuring that they continue to read and meet with faculty. Some faculty also viewed the general exam as a way of "sifting out students" who were unlikely to successfully complete the program.

*5.3.4 Dissertation (formal)*

During the quarter immediately following a student's successful completion of the general exam, the student is expected to select a supervisor and reading committee which may or may not consist of individuals from the student's supervisory committee. Shortly after, students are expected to submit their dissertation proposal or dissertation prospectus. This document ultimately serves as a guide or outline for their dissertation.

With regards to the dissertation, there is little explicit structure or guidelines. In general, dissertation topics can be chosen from a broad range of areas including: (1) the comparative study of authors or themes in different languages; (2) issues in the fields of theory or literature and history, or criticism; (3) the study of literary authors or themes whose significance transcends national or linguistic boundaries and (4) the study of such phenomena as transmission, reception, and influence (Department of Comparative Literature Website).

The faculty viewed the dissertation as evaluative and as a way for students to "push themselves." One professor said that the dissertation was a way for him to communicate with his students and to talk to them about what a good methodological approach might be. The faculty acknowledged that many students struggled during this stage and it was the hardest of all the requirements for students to complete. One professor attributed this to the reality that when writing a dissertation students only get

"periodic reinforcement" and they have to cope with interacting less with others and spending a lot of time alone in front of a computer.

*5.3.5 Informal activities*

In addition to the formal program requirements (e.g., coursework, exams) the faculty identified a number of informal experiences and opportunities that they encouraged their students to participate in. The department organized some of these informal experiences, such as the dissertation writing support group and departmental lectures. However, they also talked about the many activities outside of the department and these included: other departmental seminars, general seminars, activities in the university's Humanities Center, reading groups in other departments, job talks, and local, regional, and national conferences.

*5.3.6 Role of the advisor*

The three faculty emphasized different things when describing what they saw as their role as an advisor. One professor said that his function was to provide guidance "as needed" which may involve things like recommending a specific book or commenting on a student's writing. Another professor said that his role as an advisor was to be the "spur that keeps them [students] conceptually on track." He said his primary job was to ensure that the concepts that his students were developing were solid and that they really believed that what they were doing was important. Finally, the third professor said that a big focus of her work as an advisor was to get students to begin thinking about the job market as soon as possible. In this way she could help students tailor their educational experiences in order to best prepare them for jobs in the field.

*5.3.7 Apprenticeship model*

All of the faculty participants referred to having apprenticeships with their students. One professor said that more and more he had come to realize how true this was. But he and the others made several clarifications about the dynamics of these apprenticeships. One of the professors said that these apprenticeships were not a mechanism for ensuring that students "emulated or replicated" him. Instead, he saw the primary function of the apprenticeship as "inspirational" where he would help create structure and encourage the students and tell them "You are doing well!" Another professor said that because of the diversity of topics and content knowledge required to do advanced work in comparative literature students needed to have apprenticeships with multiple faculty, not just one. This was particularly evident in dissertation committees where each faculty member represented a unique expertise that was necessary for the student's overall project. No specific faculty member was more or less important than the other and so she found that apprenticeship relationships were developed between students and multiple faculty members.

**5.4 Students' comments**

In the following section I focus exclusively on the comments provided by the student candidates regarding the specific types of activities and experiences that contributed to their learning how to do research in comparative literature and whom they learned from. In addition to identifying the activities and experiences that contributed to students' learning, I also identify examples of cognitive apprenticeship tools (Collins, 2006), as described in Chapter two.

*5.4.1 Coursework (formal)*

Students reported taking a broad variety of courses that some described as "dispersive" and "hodgepodge." Despite the variety, one of the things that many of the students reported their courses prepared them for was how to do close readings of texts. In their classes they learned how to read difficult texts and how to find different ways of relating to the material. One student said that she appreciated the way one professor modeled that it was okay not to initially understand what an author was saying (*modeling, coaching, reflection)*. Students said learning how to do close readings of texts was a first step in doing advanced work in the field. Additionally, some of the students said that through their classes they were able to improve their writing and editing skills, observe different teaching styles, and interact more with their peers.

Even though students learned how to do close readings of the texts in their classes, they observed a mismatch between what they were doing in some of their classes and what they needed to learn in order to do advanced work. They said the major thing they had learned was what each professor's expectations were and what a final paper should look like and how many resources they were expected to include. Only one student brought up in the interview how some of the books and papers from his seminars became part of his dissertation and future articles.

*5.4.2 General examination (formal)*

Across the board, students found their general exams to be the most helpful and useful part of their program (*coaching, articulation, reflection, exploration)*. One student described it as the "...best experience so far!" Students found that the general exam helped them to make their "biggest breakthrough" in formulating their dissertation question and articulating their original idea. One student said that he synthesized more

information while preparing and completing his exams than he ever had before. For example, one student said that one of his exam questions became the core of his dissertation. Students said that they received constructive feedback from their committee, which helped them to push their ideas forward.

There were only two somewhat negative comments about the exams. The first was from one student who said that he had to figure everything out on his own. In other words, he lacked direction and guidance on how to prepare for the exam and how to make it an effective or efficient process. Nevertheless, it ended up being a good experience for him. Another student who had a really positive experience with the exam said that it seemed like nobody really cared when he went on to write his prospectus. Up until the general exam he found that there had been quite a bit of structure and guidance so it was shocking to him how quickly that structure disappeared after the general exam.

*5.4.3 Dissertation prospectus (formal)*

The majority of the students were critical of the prospectus requirement in their program. The dissertation prospectus was meant to be an explanation of students' projects and the plan for making progress (*scaffolding, articulation).* Only one student said that it was the easiest part of the whole process because it came directly out of what she had written in her general exam. Even though the ideas that she formulated in the prospectus evolved and become more refined during the writing of her dissertation, the prospectus had been an enormous help.

The majority of the students did not find the prospectus to be useful. One common observation was that the prospectus was just an exercise in "speculation" (*scaffolding*). For many of the students the prospectus ended up having nothing to do

with the dissertation and several of the students knew that it was going to change, which made it seem like a waste of time. One student said that the prospectus could have been a useful document if she had come into her general exam already knowing what her dissertation topic was going to be. Another student characterized the prospectus as "making stabs in the dark; firing into the dark." He said that, although it would seem that developing an outline would be a useful exercise, it wasn't until he actually began writing his dissertation that he was able to organize it. For these students, the prospectus became one more hurdle they had to pass.

Another student experienced very little guidance around how to prepare the prospectus. This student said that the only thing he had to go from was the written comments on his general exam from his committee members. Another student described receiving mixed messages about the purpose of the prospectus. On the one hand he was told it was just an internal document and he didn't need to worry about it and on the other hand was told that he needed to do a good job because it would help him with his dissertation. Finally, one student found it overwhelming to have to complete the prospectus the quarter immediately after the general exam. He said that he was physically and mentally drained from having completed the general exam and it was too much to have to prepare a prospectus so shortly afterwards.

*5.4.4 Dissertation (formal)*

All of the students interviewed were currently completing their dissertations, but a few had some observations of the process. One student shared that he had found the dissertation to be a really "personal and lonely process." He said that if he did not actively seek out feedback from his advisor and committee members he would have been

left to push his work forward on his own. Similarly, another student said that while he was enjoying the writing process and the freedom to pursue his interests, the "loose affiliation" he had with the department also resulted in "loose oversight" of his dissertation. He said that it would have been more helpful to him and other students if the department had "tighter control" over the process.

*5.4.5 Teaching (formal)*

The majority of the students commented that while their teaching assistantships had made them better teachers in most cases their teaching had nothing to do with their research and often interfered with their research. Only a few of the students described their teaching experiences as contributing to their research in positive ways. One student said that through his teaching he had acquired effective persuasion strategies because of the random and unexpected questions that students would ask in class *(articulation)*. Over time he was able to learn how to successfully convey an argument in a short amount of time without being "totally boring." Another student said that even though it was not completely apparent he knew that teaching about the texts that he was writing about definitely informed how he wrote about them.

The difference in students' experiences and the impact that teaching had on their own advanced work seemed to be a result of how closely related the courses were to their dissertation topic. Unfortunately for most of the students, the majority of the classes that they taught were language classes.

In addition to the formal program requirements, students identified additional activities, or informal activities, which contributed to their learning how to do advanced work in comparative literature.

*5.4.6 Department seminars and conferences (informal)*

Another activity that students identified as contributing to their ability to do advanced work was attending department seminars and conferences. Several of the students found value in attending talks across campus because it exposed them to different disciplines and different ways of doing advanced work. By observing how advanced work is done in other fields, students found that it helped them to delineate their own field and situate themselves within it.

Attending and presenting at local, regional, and national conferences was also valuable to students because it gave them a real deadline and they were able to receive feedback on their work. One student shared how after presenting a paper at a conference he was initially frustrated with the comments he had received. Over time however, he realized that the critiques were actually counter-arguments to his thesis and that if he had considered these from the beginning he would have had a stronger argument.

Three of the students interviewed talked about their experience organizing and coordinating an interdisciplinary graduate student conference at State University. Students in the Department of Comparative Literature started the conference several years ago. The students who had taken part in organizing this conference said that it was a really valuable experience because they had to work with others to develop a call for papers, review submissions, set up panels and get people to moderate. As a result they learned not only about organizing a conference, but also about interdisciplinary approaches to knowledge and how to collaborate and work with others.

Overall, one of the greatest benefits of attending department seminars and conferences was that students were able to observe scholars presenting their work which

helped them to better articulate their own work and to reflect on their own problem solving processes (*modeling, articulation, reflection)*. Another benefit was learning strategies of how make their work accessible to those who might not be familiar with their topic.

*5.4.7 Student groups (informal)*

The current Department Chair organized another informal learning experience, a dissertation writing support group. Under the leadership of one faculty member, students convened and received feedback once a quarter on some part of their dissertation. Several of the students interviewed had been a part of this group. For one student he found that the timing was a bit off because he was still working on his prospectus and many of his ideas were still, as he described, "half-baked." Another student found the group to be helpful in terms of getting feedback on her work, seeing what others were doing, even if it was really different from what she was doing, and in seeing that other students were struggling with many of the same things that she was struggling with (*modeling, coaching, articulation, and reflection)*. This student found it especially valuable to get feedback from the faculty member leading the group. For another student, the main benefit of the group was that it made him write by creating a real deadline.

Some additional examples of informal learning experiences identified by some of the students included a publication colloquium and organizing reading groups. In the publication colloquium, students from various departments presented manuscripts that they were working on and each student participant was required to respond to two articles each quarter (*modeling, coaching, articulation, and reflection)*. The benefit of this group for one student was in providing a deadline and helping him to get an article into shape.

At the same time one of the challenges of the group was that because of its interdisciplinary nature the feedback could at times be irrelevant. Another student talked about organizing a reading group with students in another department in order to read and talk about books that hadn't been covered in their courses.

*5.4.8 Combination of experiences (informal)*

Although students were able to provide examples of how they learned from certain activities and individuals, many of them found that it was not any one single activity that prepared them for advanced work. Instead, it was a combination of activities and interactions during their Ph.D. program that helped them to become a scholar in comparative literature. For many, the transformation was not obvious; in fact one student described it as "imperceptible." She found that becoming a scholar had occurred through a combination of taking classes, reading a lot of theory, realizing that this is how you do responsible advanced work aligning yourself with what other respected scholars do, and finally identifying your question and your original contribution.

*5.4.9 Faculty*

Students are not automatically assigned a faculty advisor when they start the program. Students select their dissertation advisor and committee members in the second or third year of their program. As a result, while students interacted with faculty early on in their classes, it was the dissertation committee members who seemed to have the most impact on students' development as scholars. Several of the students said their committees provided a unique set of voices and provided a good balance because they each had different strengths. Each committee member approached things differently and they each brought a different expertise and focus to students' dissertation topics. Given

the nature of advanced work in comparative literature, there was no specific faculty member who had comprehensive expertise on any one dissertation topic. Students found that the diversity of their committee members ended up being an advantage because it forced them to put their work into a broader context.

One student said that her committee helped her reformulate her ideas in order to make more sense and they also opened up new avenues of exploration. Another student found that the process of submitting work and receiving feedback from her committee on what worked and didn't work helped her to learn how to do advanced work. A different student said that she was encouraged through the faculty members' questions and it helped her to develop the courage to advance and be confident that she had shaped her own argument and was an authority in the field. Additionally, many of the students found that their committee members helped them with their writing.

*5.4.10 Peers*

The students provided only a few examples of how they had learned to do advanced work from their peers. A few described getting tips from others on things like which books to read or what classes to take. In some instances, students described that they would read each other's work and give each other feedback. One student observed that some of the harshest criticism he received was not from committee members but from his peers. Students generally talked about sharing "tidbits" of information here and there but the information was never comprehensive or regularly shared.

One of the reasons for this, according to the students was that while they came in as an unofficial cohort they were quickly dispersed across the university in different departments according to their teaching appointments. Although students could and

would connect during classes they found it very difficult to form a strong peer community. One student said that while he was intellectually at home in comparative literature it was physically not his home and he didn't feel that the department was a community.

At the same time most, but not all of the students talked about participating in some student community that either emerged within the department or beyond. These included a dissertation writing support group, a publication colloquium and an interdisciplinary graduate student conference, which were all discussed above.

*5.4.11 Independent learning*

One of the things that emerged during the interviews was that students in comparative literature had learned that they had to be independent learners in order to be successful in the program. While there were certain opportunities and structures in place to teach them certain things, much of how they learned to do advanced work was a result of their own independent efforts and initiative. Many students described themselves as having to figure things out on their own and that there wasn't anyone necessarily showing them the way. Students overwhelmingly described feeling like they were on their own.

One student gave an example of how, in an effort to become a better writer and build a compelling argument, he found two or three works that were really important and he modeled his own work after them. Even though his committee was critical of him for copying someone else's style he described this as important first step towards becoming confident in the genre of writing in comparative literature.

*5.4.12 Apprenticeship relationships*

Every student interviewed had a unique response to the question of whether or not they had learned through apprenticeship relationships with others. Only one student agreed that he had developed an apprenticeship relationship with his advisor. The reason he characterized their relationship as such was because they both did advanced work on a similar national literature, which afforded multiple opportunities to work together on their shared topic of interest. This included everything from teaching together, writing together, and working closely on the dissertation. He was the only student interviewed that identified any sort of significant ongoing collaborative relationship with their advisor.

Three of the students described having more short-term apprenticeship relationships with different faculty members. One student likened her apprenticeship relationships to the experience of a medical resident. Like a resident, she described having completed rotations with several different faculty members that covered different topics. For this student, although these apprenticeships were short-term, they primarily occurred before she began her dissertation. In contrast, another student argued that his apprenticeship did not really begin until after the general exam when a transition occurred where he went from having teacher-student relationships to being seen and treated more like an apprentice. For example, he found that his committee became more focused on showing him how to be a professional in the field. Another student also described having apprenticeship relationships with his professors around learning how to teach and how to write papers.

The remaining three students reported that they did not have apprenticeship relationships with their advisor or other faculty members. One student said that her

interactions with faculty were best described as advising and mentoring relationships. The distinction for her was that she never spent a lot of time working closely with any one in particular, which she considered a general feature of an apprenticeship. Another student said that he did have an apprenticeship, but it was in fact with his books. So, while professors made recommendations about what he should read, his sustained relationships and conversations were with specific texts. Finally, one student believed that there was no single person who could have helped her "step-by-step" because the discipline was so nebulous and very little of the work in comparative literature was consistent across topics. In other words, she did not believe that things could be easily transferred or translated across projects and questioned the need for apprenticeships at all.

## 5.5 Discussion-Apprenticeship model in the Department of Comparative Literature

The conceptual model developed for this study integrates literature from adult learning theory, job markets, professional education, and schooling in an effort to understand how doctoral students learned to do research in the field. The following section examines the extent to which apprenticeships facilitated students' learning of how to do research in the Department of Comparative Literature.

### *5.5.1 Community of practice*

The evidence from the Department of Comparative Literature did not lead to one comprehensive apprenticeship model. Instead, there was a range of experiences among the students with regards to their access to apprenticeship relationships.

If we refer to the continuum of apprenticeships in the conceptual framework, the majority of the students interviewed (n=4) did experience some type of apprenticeship relationship. There was one student who described having a very traditional

apprenticeship relationship with his advisor. He attributed its traditional nature to the fact that, because they worked in a similar subject area, they had more opportunities to work together and collaborate. This student worked continuously with his advisor throughout his studies and on a variety of different activities: advanced work, teaching and writing projects. It is interesting to note that although the student described having a close relationship with his advisor, he did not characterize it as collegial. He said the following:

> ...We work together a lot and we do a lot of things together and we're very involved with each other's work. But at the same time, there's a little bit of friction. It's just the way our relationship has always been, a little more strained or uncomfortable...maybe it's because I know that there's so much at stake when I'm talking to her and she's the person who has been supervising my work for the last six years and I know that she has high expectations that I occasionally don't meet.

In contrast, although he did not describe having an apprenticeship relationship with anybody else, he described his relationships with other committee members as much more relaxed. Although personality factors could definitely play a role here, this student's experience highlights some of the power dynamics that have been critiqued in traditional apprenticeship relationships (Burmester, 2003).

All of the faculty members and three of the doctoral candidates did characterize their faculty-student relationships as apprenticeships. Along the continuum of apprenticeships, their descriptions would fall somewhere in between traditional apprenticeships and communities of practice (Wenger, 1998). First, this group saw the apprenticeship relationship as occurring exclusively between faculty and students, which

may include advisors, committee members and other faculty members. Although the faculty members interviewed did talk about the role that peers could play in students' learning, they did not qualify these interactions as apprenticeships. Similarly, the students themselves characterized the apprenticeship relationship as exclusive to their interactions with faculty members.

Second, the students indicated that their apprenticeship relationships were not long-term or ongoing throughout their studies. Instead, they described engaging in short-term apprenticeship interactions, which were focused on particular activities like teaching or writing. The short-term characterization distinguishes these apprenticeships from traditional apprenticeships because those are generally defined as long-term.

Third, there was some disagreement amongst the students about the timing of their apprenticeship relationships. For example, one student observed that her apprenticeships occurred before her general exam while another student said that they started only after the general exam. In more traditional apprenticeships, as well as those in communities of practice, the assumption is that apprenticeship relationships occur throughout one's education. For these three reasons the apprenticeship relationships described by the faculty members and these three students fall in the middle of the continuum of apprenticeships in the conceptual framework of this study.

Although the description of apprenticeships provided by the faculty members and students could be considered group apprenticeships or communities of practice, the evidence points to the existence of a very "loose" community of practice in the Department of Comparative Literature. While students were moving from the periphery to the center of the community, this was more a function of dissertation committee and

for some students' participation in smaller cross-disciplinary communities. Wenger (1998) defined a community of practice as made up of people who are mutually engaged, have a joint negotiated enterprise and a shared repertoire (i.e., routines, tools, ways of doing things, etc.). The interview data showed that faculty and students in the comparative literature department were all actively doing advanced work using a comparatists approach. Students were also engaged in various relationships with faculty and students through the formal requirements and informal activities of the Ph.D. program and students insisted that their intellectual home was in comparative literature. At the same time, the student's affiliation with the program was inconsistent over time as a result of things like: the lack of a faculty advisor upon entry into the program, teaching appointments across the university, and minimal department-wide activities. These and other variables resulted in a department with a very "loose" community of practice that was concentrated in subgroups.

The development of a joint enterprise in a community of practice is an ongoing collective process of negotiation in which participants have to both learn and adopt the historical legacy of the enterprise while at the same time re-defining it. Students and faculty in comparative literature were doing this through their teaching and their advanced work. However, because the faculty and students from comparative literature were commonly affiliated with other programs, they had a limited number of opportunities to engage in negotiation. For example, the students did not have a core course on comparative literature and there were very few opportunities for the students to collaborate or work together. As a result, there were just three examples of efforts to bring students together around their scholarship. This included the dissertation writing

group, the publication colloquium, and the graduate student conference. Although these were not exclusive to students from comparative literature, it gave several of the students interviewed an opportunity to compare their work with others and negotiate their enterprise. So, while the students were able to negotiate some aspects of their advanced work in the small student groups, the primary site of negotiation was with their dissertation committees.

The final characteristic of a community of practice is the presence of a shared repertoire. While it is clear that there is a repertoire of scholarly techniques used in comparative literature it was not always obvious, from the student's perspective, how effectively these were shared. Certain students were very critical of the fact that there was a lack of explicit instruction in many of the skills necessary in the field. Many of these students described being frustrated that they had to start from scratch and figure things out for themselves. For example, the students talked about using other authors as a guide for their work, going to talks in other departments to compare it to their own field, attending and presenting their work at conferences, etc. Through all of these activities and experiences, the students to some degree had learned the repertoire of advanced work in the field of comparative literature with limited help from the department.

Data from the Department of Comparative Literature showed that department was a very "loose" community of practice. By this I mean that while these student interviewees were moving from the periphery to the center of the community, it was more a function of the student's dissertation committee and to a lesser extent their participation in small, student cross-disciplinary communities. In collaboration with their dissertation committee these students were able to produce advanced work that met the

standards and expectations of this group of faculty members. It is assumed that their work further reflected the nature of advanced work in the field of comparative literature even if some of the committee members were from other fields. In the smaller interdisciplinary student groups, often under the direction of a faculty member, four of the seven students interviewed were also able to mutually engage with others and develop a shared repertoire or way of doing things.

The three remaining doctoral candidates did not indicate having experienced any apprenticeship relationships while in the program. Although the students had different reasons for this, they primarily attributed this to the fact that they did not experience a long-term close relationship with anyone in the department. These students defined apprenticeships in a traditional way in which the relationship would be long-term and exclusively with one person. Additionally, two of these students did not seem to think that apprenticeship relationships were necessary or appropriate in their field. One student said that he did have a long-term apprenticeship, but it was with the various texts and authors that informed his advanced work. Another student found that because every student's scholarship was unique, there was very little that could be generalized around the process or content of their work. As a result, it didn't make sense to her that an apprenticeship relationship would be helpful in her learning how to do advanced work because so little could be transferred across projects.

*5.5.2 Apprenticeship types*

The second feature in the conceptual framework of this study differentiates between different types of apprenticeships (Sullivan, et al., 2007). For the one student who did describe having a traditional apprenticeship with his advisor, it appeared that his

apprenticeship focused on a variety of activities and skills. However, this student did not differentiate between different types of apprenticeships as illustrated by Sullivan et al. (2007). Among the three students who identified engaging in short-term apprenticeship relationships they differentiated that these interactions focused on teaching and writing. This focus could be seen as similar to skill-based apprenticeships identified by Sullivan et al. (2007). However, none of these students identified having different types of apprenticeship relationships with different people.

*5.5.3 Cognitive apprenticeship tools*

The third and final feature of the conceptual framework in this study focuses on the utilization of cognitive apprenticeship tools to facilitate apprenticeship interactions. Although the students interviewed had different apprenticeship experiences, they did provide multiple examples of cognitive apprenticeship teaching methods (Collins, 2006). One of the most prominent tools used was *modeling* in which students observed experts performing particular tasks. For example, attending a lecture in another department gave students the opportunity to observe how others approached their advanced work. Modeling was also evident in the courses students took, especially in learning how to do close readings of texts. One student said it was helpful to see other students and professors struggling with what an author might be saying. By watching others struggle, she learned, "It's ok if you have trouble."

*Coaching,* or bringing a student's performance close to that of an expert was most evident during the general exam and then among many of the informal Ph.D. activities described by the students, particularly the various writing groups. *Articulation*, explicitly stating knowledge and reasoning about problem solving processes, seemed to occur

during the general exam, at professional conferences, or whenever students had to explain their work. There were also two key opportunities that students discussed which seemed to provide them with opportunities for *reflection,* where they would compare their own problem solving processes with those of an expert or advanced student. These occurred most notably in department seminars and professional conferences. Several students discussed attending department seminars in comparative literature but also in other departments across the university. One student found that attending these seminars really helped her to figure out where she fit in and what she agreed with and disagreed with in other disciplinary approaches. This forced her to reflect on how her own approach to advanced work was similar to other experts or unique. Similarly, conferences provided another opportunity to engage with a larger scholarly community and observe, to some extent, how scholars and peers approached their work and made their arguments.

The only real substantial example of *scaffolding* in the Department of Comparative Literature at State University was the dissertation prospectus. Although the majority of students did not find the exercise useful, it did force them to think about their dissertation and to communicate their ideas to their committees. Even though many of them described the general exam as just another "hurdle" to jump through, it did help them prepare for their dissertation by forcing them to put something down on paper and prepare for the increasingly complicated tasks of the dissertation. *Exploration,* or guiding students to be able to problem solve on their own was evident through the general exam, which for many of the students was their first time summarizing a lot of information on a topic of their choosing, and where they were able to begin to tackle their own research questions.

It is striking that many of the cognitive apprenticeship teaching methods were evident within the informal Ph.D. activities identified by students. What is interesting about these informal activities is that they include a large number of doctoral students and faculty members from other departments. Although the student interviewees did not recognize their peers as significantly contributing to their learning, the role of the informal Ph.D. activities suggests that students were learning a lot from their peers and other faculty outside of their department.

In sum, the evidence suggests that some of the students did learn how to do advanced work in comparative literature through apprenticeship relationships. The following table seeks to capture the apprenticeship model in comparative literature in relation to the conceptual framework of this study.

Table 12

*Apprenticeship Model in the Department of Comparative Literature*

| | |
|---|---|
| Continuum of apprenticeship relationships | There was a spread of apprenticeships across the students' experiences ranging from a very traditional apprenticeship (with faculty), to short-term apprenticeship relationships (with faculty) that varied over time, to smaller communities of practice in and beyond the department (with faculty and peers). The department, overall, is a "loose" community of practice. |
| Apprenticeship types | The participants made no real distinction between different apprenticeship types. Specific examples of content included learning about or working on teaching and writing. |
| Cognitive apprenticeship tools | Cognitive apprenticeship tools mediate apprenticeship relationships:<br>• *Modeling*-Attending a lecture in another department, showing students how to do a close reading of text in the classroom<br>• *Coaching*-General exam, writing groups<br>• *Scaffolding*-Dissertation prospectus<br>• *Articulation*-General exam and professional conferences<br>• *Reflection*-Department seminars and professional conferences<br>• *Exploration*- General exam, prospectus, dissertation |

*5.5.4 Other observations*

One of the most striking things that emerged from the interviews in comparative literature was the "loose affiliation" among members of the department. Students and faculty appear to be constantly interacting with and moving across various departments.

The emphasis on interdisciplinary experiences raises the question of how doctoral students, in particular, are able to learn the principles and practices of comparative literature. Some of the literature on interdisciplinary doctoral education suggests that interdisciplinary experiences can be unsettling to students, especially as they try and develop their expertise within a particular field (Golde & Gallagher, 1999; Holley, 2010).

At the same time the interdisciplinary nature of comparative literature provided students with the opportunity to learn how to do advanced work in various places, not just in their home department. At the same time the students interviewed were able to learn the nuances of their field through their exams and through their dissertation. Interestingly, students in the Department of Comparative Literature were much more likely than the students in the other two departments to comment on going to seminars in other departments as a way of learning what distinguished them from other scholars. In a way, their interdisciplinary experiences facilitated their own epistemological understanding and awareness. Although bioengineering is also an interdisciplinary field, those students were much less likely to spend their time outside of the department and laboratory groups.

At the same time, as illustrated above in the discussion of the apprenticeship model in comparative literature, there is no solid apprenticeship model and there is no strong visible community of practice in the department. Students regularly described being disconnected and isolated from the Department of Comparative Literature. Although I was not able to measure this in my study, I wonder to what extent the lack of community may have led other students, not interviewed, to be dissatisfied with the department? To what extent could attrition from the department be a result of this lack of

community? As described by some of the students, a significant change occurred after their general exam where many described suddenly being on their own. The students interviewed figured out that it was up to them to seek assistance, and initiate contact. Although learning how to advocate for yourself is a critical skill that all doctoral students must learn, how might the program unintentionally be contributing to students' non-completion of the dissertation and student departure? Research by Lovitts (2001), for example showed that departments that do not have strongly bonded communities will have high attrition rates.

### 5.6 Summary

In the Department of Comparative Literature, there is a "loose" community of practice that is primarily composed of smaller communities within and beyond the department. Within these communities, doctoral students described having a variety of apprenticeship relationships ranging from the more traditional one-on-one interactions with an advisor to more short-term apprenticeship relationships with multiple faculty members. There was no real differentiation of apprenticeship types by those in the department. Finally, individual cognitive apprenticeship tools mediated students' learning primarily through individual department-based activities.

# Chapter 6

# DEPARTMENT OF SOCIOLOGY

*...In order to be a contemporary contributing sociologist you have to have the ability to read quantitative work because so much of the work, nationally and in the leading journals, is mathematical.*

-Sociology faculty member

*...At the end of the day, I think most people who probably belong in the Ph.D. program, or should be graduating and getting a degree, kind of figure it out...*

-Sociology doctoral candidate

## 6.1 Sociology at State University

The Sociology Department at State University is a well-established and distinguished department. The department describes being committed to solving sociological problems and it emphasizes sociological theory and quantitative methodology in its graduate curriculum. The three emphases in the graduate program include:

- Understanding and critically evaluating social theory and empirical research
- Doing theoretically guided research that explores, assesses, and further develops explanatory theories
- Developing communication skills (with emphasis on scholarly writing and teaching) that will be useful in transmitting sociological knowledge.

At the time of the study, the department had over 25 core faculty members, over 110 graduate students, and over 300 undergraduate students.

Over the last ten years (1999-2009) the department has awarded, on average, 6.6 Ph.D.s a year (State University Graduate School website). In the department there are eight key areas of study: Demography and Social Ecology, Deviance and Social Control, Family and Kinship, Institutional Analysis, Research Methodology, Sociology of Sex and Gender, Stratification, Race and Ethnicity, and Theory.

Students admitted to the Ph.D. program at State University begin in a non-terminal master's degree program and then re-apply to the Ph.D. program after successfully completing a master's thesis. When students are admitted to the program they are assigned an advisor according their interests. Students may however change advisors depending on their topic of interest. In the master's degree program students are expected to complete their coursework and master's thesis in three years as full-time students (45 credits). During their first year, students take a set group of classes focused on quantitative methods and sociological theory. Once advanced to the Ph.D. program, students are required to take an additional 15 credits, complete subject area exams, a dissertation prospectus, and the dissertation. The department expects students to take an additional two years to complete the Ph.D., totaling 5 years.

*6.1.1 Reputation of the Ph.D. Program*

The Department of Sociology at State University subscribes to a "scientific model of social science inquiry." From the faculty's perspective, the purpose of the Ph.D. program is to prepare students to become faculty members at similar institutions. From the beginning of the program students are encouraged to think about themselves as researchers: specifically quantitative researchers. One professor said that the department

had a culture of producing researchers, she said, "...it's in the air...this is a place that turns people into researchers."

In order to accomplish this, both the faculty and the students described the program as much more "structured" than other sociology programs. One professor commented that while students in other sociology programs were often left to sink or swim, the program at State University used a hands-on-approach to guide its students. One professor justified the need for structure on the basis that their graduate students often arrived with very different understandings of sociology and sociological research. In order to address these discrepancies, students in the master's program were required to take a core set of classes focused on theory and quantitative methods.

Because of the program's thorough training in social statistics, the department has earned an excellent reputation both locally and nationally. For the faculty and students interviewed, their positive reputation was a real source of pride. All four faculty members mentioned how the students from their department were regularly recruited for RAships in departments and research centers across State University. Only one of the faculty members expressed some concern that students were not being trained more broadly (methodologically) and deeply (to understand the theoretical ideas behind empirical research). This professor was concerned that the program was in danger of becoming a machine shop that churned out graduates who failed to reflect, read broadly, or be innovative and creative with their research.

All of the students interviewed appreciated the high-quality training they received in social statistics: the most prestigious methodology in the field. One student said that the faculty members in the program were clearly "...indoctrinating students with their

own version of sociology." Another student said that the department did a good job of arguing that there was one "best" way to do research. While overall pleased with the quantitative focus of the program, some of the students also expressed some regret that they did not have more preparation in qualitative research, which would have made them more methodologically well rounded.

*6.1.2 Funding of students*[18]

The Department of Sociology at State University has traditionally been able to guarantee four years of funding for MA-Ph.D. students; typically in the form of a Teaching Assistantship (TA).[19] According to one professor, approximately 20-30% of students were on Research Assistantships (RAships) each year. While some of these were in the department, many of them were across the university. The following table provides a breakdown of the different funding sources for the seven doctoral candidates interviewed in this study. Pseudonyms were used for each of the students.

[18] There was a lot of discussion about funding because of current and anticipated budget cuts.
[19] The four years of guaranteed funding does not include the summer. Many students, once they've received their master's degree, will teach their own course to receive funding.

Table 13

*Sociology Students' Funding Over Their Tenure in the Program*

| Name | TA in the dept. | TA outside dept. | RA in the dept. | RA in other dept. or program | Fellowship(s) | Teaching at other institution | Other on-campus employment | Off campus employment | Loans |
|---|---|---|---|---|---|---|---|---|---|
| Aiden | X | | X | | | | | | |
| Hailey | X | | | | | | | X | X |
| Hannah | X | | | X | X | | | | |
| Jordan | X | | | X | | | X | | |
| Madison | X | | X | | | | | | |
| Noah | X | X | | | | X | | | |
| Olivia | X | X | | | X | | | X | |

The faculty had strong opinions about the funding structure in the department and its consequences for students' experiences. In some cases, the faculty reported that being a TA could help students with developing their teaching skills, which they all agreed was important. However, they also recognized that teaching only indirectly informed or contributed to students' research. The exception was if the student was a TA for a methods course or if he or she taught a course in an area closely related to their research topic.

Overall, the faculty members did not view the department's reliance on TAships as ideal for students, even if it did "...put bread on the table!" One faculty member observed that the reliance on TAships impacted the department's ability to recruit students and diverted students' attention away from their research. Another professor described TAships as dangerous or distracting because students were likely to receive positive feedback from their interactions with undergraduate students that would distract them from their research. He said the rewards from teaching were usually positive and more immediate than those from research in which the student was more likely to get "beat up" than "stoked."

In contrast, the faculty members were much more in favor of funding students through RAships. The chair of the department discussed how the department was trying to encourage and reward faculty for writing research grants that included RAships for graduate students. Because of the limited number of RAships in the sociology department many students had to find RAships outside of the department. One professor commented on how they always had to scramble at the last minute to fill TAships in the department because so many of their students would get RAships in other departments.

While all faculty members agreed that RAships significantly helped students with their research, they also found that it presented some challenges when students were recruited to appointments outside of the sociology department. The faculty observed that when their students got work in other units they often would become disconnected from the sociology department and become interested in other topics. One faculty member said he had seen students getting sucked up into other research projects, which prevented them from making progress on their own dissertations. One of the students also suggested that

because so many of the students from sociology found RAships in more applied fields (e.g., social work, public policy) students often became more interested in non-academic careers.

**6.2 Nature of research in sociology**

The faculty and students at State University acknowledged that there is a broad range of research being done in sociology. As one faculty member put it, there is no strong pattern or single kind of study being conducted in the field. One student said, "...it seems like with sociology you can get away with doing anything as long as you relate it to society in some broader sense." Another faculty member observed that sociological research generally involved collecting data from the social world, although there were many different types of data that could be collected in many different ways. Despite this breadth, both students and faculty members agreed that sociological research typically fell into two distinct types: quantitative or qualitative. Quantitative research utilized the "scientific approach" and "theory testing" and qualitative research employed "ethnography" and "fieldwork." The participants discussed how the research question and the researcher's pref

successful in sociology. Another professor said that sociology was an art that required a real "intelligence" to do well. If students came to the program with these traits and the "commitment," faculty believed the department could help them develop the skills needed to be good researchers.

The faculty members also identified several skills they believed to be necessary to do sociological research. The first of these was the ability to critique a body of literature and identify its strengths and weaknesses. Students had to learn that, although a well-known sociologist might have conducted a study, it still warranted rigorous critique. One professor observed that it was easy for students to be critical of other research, but the real challenge was learning how to become a "reasonable critic." In other words, students needed to develop an understanding for how research was done and recognize that good working scientists often had to make difficult compromises. The faculty believed that once students had a solid understanding of the literature they would then be able to generate "good" research questions. Two of the faculty talked about the importance of having a researchable or "doable" question. One of these faculty members said, "A lot of students say, okay, I'm really interested in this topic, not realizing that it might be impossible to give an answer to the question that they're really interested in."

In order to be able to critique the literature the faculty believed students had to develop statistical literacy and know-how. One professor argued that because quantitative research followed a set pattern it was inherently easier than other types of research to scrutinize. The faculty all agreed that it was absolutely essential that their students learn how to do good quantitative research and have some understanding of qualitative research. The faculty members interviewed said that doing quantitative research primarily

involved following certain procedures and learning how to use statistical software. One professor said, "...if you are not screwing up the assumptions, if you are doing everything basically the same way and not doing any cutting edge stuff, you sort of just follow what people tell you to do." Finally, the faculty members also said that students needed to develop a solid understanding of study design and sharpen their rhetorical skills.

The students also identified a set of general personality traits that were necessary for doing research. These included: being a critical thinker, creativity, and persistence. However, the students went into much more depth with regards to the types of skills they needed in order to do research in sociology. First, the students said that you needed to be able to conceptualize a body of literature, understand what has and hasn't been done, and then know what the main theories are. Then, students argued, you had to be able to generate "good" questions that were not only "novel," but also "doable." Once a question had been identified, you had to be able to figure out the most appropriate method to answer that question. Some of the students mentioned the importance of being able to design a theory, relate it to larger concepts and derive and test hypotheses related to that theory. Another skill mentioned was the ability to know where to find data and what to do with it (i.e., how to clean it up for analysis). Finally, the students said it was very important to know how to converse with other people about your research and about different methods.

**6.3 Faculty comments**

In the following section I focus exclusively on the comments provided by the faculty members regarding the activities and experiences that they identified as preparing

students to become independent researchers. Additionally, I present their opinion about the role of the advisor and apprenticeship relationships in preparing future researchers.

*6.3.1 Coursework (formal)*

As mentioned above, students entered the program with varying degrees of sociological knowledge and experience. The faculty interviewed primarily discussed the role and function of the structured course sequence in the non-terminal master's program. They argued that it helped to ensure that all students received the same foundation. One professor said that this sequence of classes was especially important for students who had little or no math prior to entering the program. One additional benefit of the sequenced courses, according to the faculty, was the development of a functional cohort among the students as a result of students spending the majority of their first year together.

*6.3.2 Master's thesis (formal)*

The expectation of the program and the faculty was that students would complete their master's thesis during their third year in the program. The faculty described the thesis as the student's first opportunity to engage in independent original research. Students were expected to work with their advisor and one additional faculty member to complete this requirement. According to one professor, one of the advantages of having a two-person committee was that it taught the students how to reconcile different opinions.

The faculty discussed how students were guided to model their thesis after a journal article with the hope that they would be able to publish it in the future. In some cases, students did go on to publish their thesis. In order to accomplish this, students had to demonstrate a sound understanding of the topic, sociological theory, and method. The faculty agreed that the thesis was more than just another hoop for students to jump

through, but instead was an exercise that would help students move forward and provide them with the skills they would need to be successful in the Ph.D. program and in the professoriate. Although rare, the faculty members reported that if the quality of the master's thesis was not acceptable, the student would not be admitted to the Ph.D. program.[20]

*6.3.3 Subject area examinations (formal)*

Students in the Department of Sociology are required to complete two subject area exams: a major and a minor. Students must select their major and minor from the eight key areas of study in the department. Students are expected to complete the exams by the end of their fourth year if admitted to the program at pre-M.A. level or by the end of their third year if admitted at the post-M.A. level. The purpose of the major exam is for the student to demonstrate preparation to conduct independent research and to teach in the relevant area. The major area exam is conducted over a two-day period. The minor exam is designed to demonstrate familiarity in order to be able to teach in that area. This portion of the exam is conducted in a one-day period and consists of a paper of 15-page maximum length.

One of the faculty members said that the goal of the subject area exams should be for students to learn: (1) what are the big and important questions in the field, and (2) how to ask good questions. Another professor focused more on the outcome of these exams arguing that they help students become teachers since they acquired broad expertise in a particular subject area. The faculty members interviewed alluded to an ongoing debate in the department regarding the ultimate purpose of the subject area examinations.

[20] I was unable to find out how many students on average did not continue on to the Ph.D. program.

*6.3.4 Dissertation prospectus and general examination (formal)*

In the Sociology Department the general examination involves the successful defense of a dissertation prospectus that outlines a student's plan for the Ph.D. dissertation. Students develop their dissertation prospectus by working closely with their supervisory committee chairperson. Students are expected to solidify their Ph.D. supervisory committee no later than four months before the general exam. When the dissertation prospectus is close to completion, the supervisory committee members meet to consider it for approval, which occurs during the general exam or dissertation prospectus defense.

The faculty members interviewed found the prospectus to be an effective tool for getting students to identify their research question and articulate why their question is important and how they planned to answer it. One professor saw the prospectus as a way of getting students motivated and focused on "doing" their dissertation. The faculty also saw the prospectus and the general exam as a crucial opportunity for students to get feedback from their supervisory committee.

*6.3.5 Dissertation (formal)*

In the Sociology Department at State University, the dissertation is defined as an original and independent research project. By successfully defending a dissertation a student will have demonstrated their ability to select an important research question, mastery of research methods, and the skill to execute the project competently. The faculty reported that the dissertation was a productive and instructive way for students to learn how to do research under the guidance of their supervisory committee. For example, one professor said that, by the time a student had reached the dissertation stage, she or he had

already learned the methods necessary to complete the study. As a dissertation chair she viewed her role as akin to being a consultant or guide. So, she would commonly encourage students to think about the relationship between their research question, the data, and the theoretical implications.

*6.3.6 Informal activities*

In addition to discussing the role of formal program requirements (e.g., coursework, general exam, etc.), the faculty also identified a number of informal experiences that they encouraged their students to participate in to develop as researchers. One professor said he believed the informal experiences were even more important than the formal ones in the training of sociologists.

The first informal learning experience identified by the faculty was department seminars. The faculty believed that students who attended seminars, either in or out of the department, would learn a lot about research. During these presentations students could come to understand why researchers made the decisions that they did and learn differences in style and substance. Eventually, the faculty hoped that students would be able to present their own work and get feedback from a larger community of scholars. One professor noted that many of the faculty in the department noticed which students attended these seminars and which ones didn't. He found that students who regularly attended these seminars were more likely to find academic appointments at institutions comparable to State University.

Another key informal learning opportunity identified by the faculty was professional conferences. The faculty members saw conferences as a valuable opportunity for students to find colleagues doing similar work and to learn about other

types of research in the field. The faculty said that the department strongly encouraged all of their students to present at these conferences. In the past, the department diverted faculty travel funds to partially subsidize graduate students' travel to present their work at professional conferences. This level of support reaffirmed, for the faculty interviewed, the value the department placed on students attending and presenting at these conferences.

One professor discussed the importance of learning to collaborate with others and he focused on faculty-student co-authored papers. He said these experiences were beneficial for students because they learned the "technical and artistic" aspects of how research gets done by writing a co-authored paper for presentation or publication. And, at the same time, these collaborations were also mutually beneficial for faculty members because it helped them to increase their research output.

Another professor discussed how he would show students his reviews of other manuscripts. He said that it both illustrated to students what a review would look like and how students should deal with critiques and learn to determine what is most useful. By reviewing these manuscripts students also got an idea of what an article should look like at the time of submission.

The final informal activity identified by the faculty included social get-togethers and happy hours. The faculty observed that these social activities actually served as valuable learning opportunities for students. They argued that, during these gatherings, students were likely to discuss their research and get valuable insight into their work from their peers. The faculty acknowledged that students often could learn a lot from their peers.

*6.3.7 Role of the advisor*

In addition to discussing the formal and informal learning experiences that contributed to students' development as researchers, the faculty also discussed their role as advisors. Many of the faculty members referred to how their own experience as a graduate student informed how they worked with their students.

Overall, the faculty said it was their job to help students move their ideas forward and to make sure that their research "served them well" (i.e., resulted in publications and ultimately a job). To accomplish this, several of the faculty members described functioning as a "consultant," particularly with students that were fairly self-motivated. As a consultant, they might "...talk things through..." with their students, field their questions, strategize on dealing with the Institutional Review Board (IRB) process, provide students with substantive feedback on their writing, and help students generate their research question and explore its feasibility. One professor said it could also be as simple as handing a student a book so that they could learn a statistical technique on their own. In contrast, the faculty discussed needing to provide a lot more structure for students who were much less motivated. As an advisor, this might include giving a student a specific timeline or due date in order to help the student move forward. Overall, as one professor said, students ultimately varied in their ability to do independent research and some would always remain more reliant on their advisors than others.

Two of the faculty interviewed described how they tried to be flexible and respond to the personalities of each student. One of these faculty members said that she had come to learn that being an advisor actually meant being a "listener" and a "therapist." The other two faculty interviewed said that they used a similar advising

approach with all of their students. One of these faculty members said that he used a hands-on approach; even if his students didn't want that because he believed that the more closely they worked together the better training they would receive.

Overall, these faculty members represented varying advisory styles. Two of the faculty said that they tried to be flexible and respond to the personalities of their students, while the other two used a similar approach with all of their students.

*6.3.8 Apprenticeship model*

All of the faculty members interviewed from the Department of Sociology described having apprenticeship relationships with their students. However, according to them, these were not traditional apprenticeships because they did not have research grants to support their students' work. For these faculty members a traditional apprenticeship involved funding a student's research through a research grant. And yet, the faculty did describe having apprenticeship relationships with their students because they were ultimately preparing students to be like them and to pursue careers in academia. The examples that they provided of their apprenticeship relationships included things like: (1) one-on-one time with their students where they talked about their research; (2) helping students to write a paper; (3) helping students to apply the skills they had acquired in their classes; (4) giving students additional books to read; and (5) referring them to others for additional guidance.

**6.4 Students' comments**

In the following section I focus exclusively on the comments provided by the student candidates regarding the specific types of activities and experiences that contributed to their learning how to do research in sociology and whom they learned

from. In addition to identifying the activities and experiences that contributed to students' learning, I also identify examples of cognitive apprenticeship tools (Collins, 2006), as described in Chapter two.

*6.4.1 Coursework (formal)*

The students had varying experiences with the courses they took. However, all of the students found the required quantitative sequence (*scaffolding*) and all subsequent statistics classes to be hugely beneficial. Students reported that in these classes they learned how to work with data and different statistical packages. They not only developed a good understanding of statistics, but they also learned how data could be represented and misrepresented. The students recognized that because of their rigorous quantitative training they had a nice baseline of social statistics knowledge, which not only increased their confidence but also made them more competitive on the job market.

In addition to the quantitative sequence, students were also required to take classes in sociological theory and research design. Some of the students recognized that these classes helped to ensure everyone had the same foundation of knowledge. They noted this was especially helpful for the students who came in to the program lacking a solid background in the discipline. Some of the students did critique the research methods course for not really preparing them with the skills and tools needed to complete their master's thesis. One student said, for example, that despite having taken the research methods course she described not knowing how to develop a research question. Another student said that he wished that this class, or another, had taught him specifically, "...how to do research." And yet, another student who came in with a master's degree

from another institution found the theory and methods course to be repetitive. He wished instead that he could have begun his own research sooner.

During the first two years of coursework some of the students interviewed were able to utilize their courses to make progress on their master's thesis. These students had a research topic in mind early on and they were able to review relevant literature and analyze their data simultaneously in their classes. These students said that they were able to apply what they had learned in class directly to their research as well as receive help from their faculty instructors (*coaching*, *modeling*). Classes that were explicit about different aspects of the research process were especially beneficial. But, not all of the students interviewed were able to make progress on their master's thesis through their courses. Some of these students said there was very little overlap between what they were doing in class and what they needed to be doing for their research. Although faculty members encouraged students to develop their master's thesis in their classes, one student said no one ever told her how to make this happen. Another student said that the homework assignments took up all of her time and didn't allow her to focus on her own original research.

Overall, the students reported that they gained different skills and opportunities through their coursework. First, students found that they learned how to read and synthesize literature primarily in their classes. They noted that their classes did not require them to memorize information, but instead learn where and how to quickly find the answers. Second, students described further developing their writing and editing skills through their class assignments. Finally, because they took all of their core classes together the students were able to really get to know each other. The required sequenced

courses, from the student's perspective, did create a cohort that they found to be beneficial.

*6.4.2 Master's thesis (formal)*

The students generally found the thesis to be a valuable learning experience. They described it as useful because it gave them "real experience" with research and the students described becoming more confident in their research abilities after completing their thesis. In addition to learning about the research process, the students described gaining other skills and resources as well. One student said that a key thing he learned was how to utilize the resources available in the department (*exploration*). Two of the students said that the thesis played a significant role in the shaping of their dissertations. For example, one student said she became familiar with her dissertation data set while working on her master's thesis. Another student said that the thesis served as a model for what her dissertation "should" look like (*scaffolding*). She found that after completing her master's thesis she had learned what she needed in order to be able to successfully complete a research study.

Although many students found the master's thesis to be a beneficial experience, other students describing having to overcome many challenges. First, some of the students were critical of not having received much guidance from the faculty or their advisor on how to write a research paper. While the faculty had clear expectations that the thesis be written in the form of a publishable paper, some of the students said there needed to be more guidelines on how to do this. Additionally, some of the students found that there was not enough structure or deadlines around the thesis making it what one student described as an "inefficient" process. Second, despite having rigorous training in

statistical analysis, some of the students struggled with things like where to find data and how to clean it up. Finally, some of the students were disappointed that their master's thesis committee members (student's advisor and one additional faculty member) were only minimally involved in the process. One student said that luckily she was able to do most of her thesis in her classes and in consultation with a statistics professor from the department (*modeling, coaching*). She said that even though her master's committee passed her and said her thesis was good, they gave her no additional feedback on her work.

*6.4.3 Subject area examinations (formal)*

The subject area exams proved to be very useful to most of the students interviewed. Students said the subject area exams gave them a chance to delve into the topics that they most cared about. Secondly, the students said they became more confident after gaining "broader control" over the pertinent theories. Some students said that the exams gave them the opportunity and the time to synthesize information (*articulation*). Another benefit of the subject area exams, according to some students, was the opportunity to learn what others were doing in the field. The students who found the subject area exams most useful, also participated in a reading group with other students or were primarily responsible for developing their own reading lists. These two activities seemed to empower the students and give them agency over the process.

In contrast, two of the student participants found the subject area exams to be more of a negative experience than a positive one. One of the students said that many of the faculty she talked to were "consistently vague" about the process and their expectations which led her to feel frustrated and baffled by the whole process. Another

student believed the exams were outright "ridiculous" and pointless because she had no plans of becoming a professor and they didn't help her at all with her research.

The variation of experiences among students became most evident in the example of two students who were both required to re-take their subject area exams. One student said that when she was studying for her exams a peer gave her an electronic copy of compiled responses to her exam questions. Because the questions largely did not change from year to year she was told to merely copy the previous responses. This student said that she did not like being put in the position of having to cheat and she wrote her responses independently. As a result, she did not pass her subject area exams. The faculty reviewers told her that she needed to re-write her exams, but they provided her with no additional feedback. In her re-write, she resorted to copying her peers' responses and she successfully passed her exam. This student found the overall process to be meaningless because she didn't get much out of the experience.

Another student who failed his exams the first time was also required to re-write his responses. He said the first time around he really did not know what he should be paying attention to in the literature. Unlike the previous student, this student was encouraged to talk to each of the faculty members who had graded his responses. During these meetings the faculty identified the strengths and weaknesses of his responses and helped him to focus on what he needed to be thinking about in his revisions (*coaching, articulation*). This student described this process as similar to sending something out for peer review and having to manage different feedback. The faculty's comments helped the student to rethink everything about the exam and he successfully passed the second time around. This student commented that if he had "just passed" the first time, he wouldn't

have gotten very much out of the process. However, because he was given the opportunity to talk to the faculty members and learn how to approach the exams, it ended up being a much more positive and beneficial experience for him.

*6.4.4 Prospectus and general examination (formal)*

The students had very little to say about the prospectus and the general exam. It seemed that most of them found it helpful because they were able to outline their dissertation research and get feedback which helped them to get excited about their projects (*articulation*). Only one student described being frustrated about having received conflicting information from faculty members regarding what the prospectus was. She said initially she had been told it was not supposed to be a final product but the expression of an idea with a viable plan of how to explore the idea. Even leading up to her defense the feedback she was receiving from her committee was that it was a well-written and strong proposal. This student reported being very "surprised" when at the defense her committee was critiquing the theories she had used as though the proposal was the final product.

*6.4.5 Dissertation (formal)*

All of the students interviewed were in varying stages of completing their dissertation. For most of the students, they said the process was going well and they were figuring things out as they went along. One student said it had taken him a while to really understand what he was working towards. Although he understood the general nature of a dissertation, it wasn't until he looked at ten different dissertations on his own initiative from his department, that he began to understand how to do it (*modeling, reflection*).

For some of the students the dissertation was an extension of their master's thesis and for others it was an entirely new project. One student said that he had been able to generate his dissertation through the RAship he had in the Sociology Department. With the assistance of his co-advisors, the Project Investigators, he was able to develop his own related questions and establish an independent project.

*6.4.6 Research assistantships (formal)*

Four of the seven students interviewed had a RAship at some point during their doctoral studies. For two of the students the RAship was in the Sociology Department and for the other two it was outside of the department. For each of these students, being involved in a research project helped them to learn how to do research. One student had a research appointment in the Sociology Department throughout his studies. As a result, he was able to be a part of the project from almost the very beginning. He said that the opportunity to observe and take part in the evolution of a research project taught him about what was needed to successfully implement and complete a research study (*modeling, coaching*). Learning what it takes to run a major research project was something that several of the students who had been RAs commented on.

Another student who had a RAship outside of the department said that being part of a research project gave him some "baseline skills" which helped him to be competent and confident in his ability to engage in the "amorphous project" of research. This student said that, while all students were smart and resourceful enough to figure out what needs to be done, students often needed the confidence to know that they can figure things out. He attributes his RAship as providing him with this confidence.

Some of the additional skills that the students said they gained through their RAships included: (1) learning where to get data, (2) how to work with data, (3) how to do interviews, (4) how to translate research for non-academic audiences, and (5) how to do different types of research. The two students who worked in a research center also commented on the benefits of being able to get advice from the others students, researchers and faculty members affiliated with those centers (*coaching*).

*6.4.7 Teaching assistantships (formal)*

As noted above, all of the students had been TAs in the Sociology Department and a few had other teaching experiences across and beyond State University. The majority of the students generally agreed that very little of their teaching experiences had helped them with their research. These students viewed their teaching experiences as "academic grunt work" that not only failed to help them with their dissertation research but also failed at helping them to become better teachers.

The exception was for the two students who had the opportunity to teach and develop their own class. These students found their teaching experience to be rewarding both personally and professionally. First, by teaching a particular subject these students learned more about the subject, which then informed their own research. Second, these students found that the opportunity to teach their own class had helped them grow and improve as teachers. For example, they had to learn how to be creative with the content, how to come up with new ways of presenting information (*articulation*), and how to manage the rush of adrenaline that comes from standing before a large class. Finally, one student said that through his teaching he was able to generate additional research projects in collaboration with students that resulted in conference presentations and publications.

In addition to discussing the role of the formal learning activities in the Sociology Department at State University the students interviewed also discussed informal learning activities that impacted their development as researchers.

*6.4.8 Professional conferences (informal)*

Four of the students discussed the value of attending and participating in professional conferences. Generally these students said that they learned how to present research (*modeling, articulation, reflection*) and they learned more about the type of work being done across the field. Conferences were also beneficial for networking and talking to other faculty members and students. These students said that through their interactions with others they received useful feedback that positively reinforced what they were doing and helped them to feel like they were on the right track. One student said that at one conference she was matched with a senior scholar who mentored her and gave her feedback on her research (*coaching*).

For one student in particular, attending professional conferences had become a major lifeline. This student's research topic was not represented in the Sociology Department at State University and there was no one in the department who she believed understood or appreciated her work. However, by attending select conferences she was able to find a community of scholars who were actively engaged in her same research topic. She said that these scholars were the first to treat her like a "peer" and a "researcher" and they validated her work.

*6.4.9 Department seminars (informal)*

Two of the students commented on the benefits of attending department seminars or talks. One student, who was strongly encouraged by her advisor to attend these talks,

said that she learned broadly about the field of sociology, how to do research, and how to present her research (*modeling, articulation, reflection*). For another student, attending these talks helped him stay connected with his colleagues in the department. He found that there were not a lot of opportunities for people in the department to get together and he made it a priority to attend these talks, to be visible, and to let others know he was around.

*6.4.10 Undergraduate research experience (informal)*

Four of the students interviewed had majored in sociology as undergraduate students. Each of these students discussed how they became interested in research during their undergraduate years. One student said that, as an undergrad, the graduate students in his program fascinated him and he often wondered who they were and what they did. He became involved in several different research projects and through those experiences learned that he loved the research process. Another student was required to write a research paper as a senior capstone and through that process he became interested in research and learned how to develop a research question and how to analyze data (*coaching*).

One of the four students studied abroad and became involved in a ten-year field research project. Through that experience she was able to see many of the challenges of research. In addition to this experience, this student was encouraged by different faculty members to ask different questions and pursue small research projects. Through various self-designed studies she learned how to conduct her own research, how to transcribe, how to write a research protocol, work with the Institutional Review Board (IRB) and

present her work (*scaffolding, coaching, and articulation*). These experiences helped convince her that she wanted to do research and go to graduate school.

Overall, these students were exposed to research early on and became interested in the process. These students were familiar with the research process after having engaged in research activities as an undergraduate student and they were relatively comfortable approaching and completing their master's thesis and dissertation as doctoral students.

*6.4.11 Volunteer work (informal)*

One student said that doing volunteer work in a nearby community had greatly informed her research. She had volunteered in hopes that she would be able to develop a mixed-methods approach for her dissertation but her committee did not support her. However, she has continued to volunteer because it relates to her dissertation topic and she found her experiences to be informative to her research.

*6.4.12 Martial arts (informal)*

Finally, one student talked about how his experience in martial arts significantly informed how he approached his education and scholarship. He said that, halfway through the program, he believed like he was on track but then he noticed that he wasn't really enjoying the process. At that particular time, he was very active in martial arts, and he found that he was gaining more satisfaction from his martial arts training than from his doctoral program. One day he realized that he could apply many of the martial arts principles to his doctoral education (*modeling*). For example, one key to success in martial arts is the ability to collaborate with others. In order to accomplish this he had to remove his "ego" and not be competitive. He applied this non-competitive attitude to his

research activities and he began collaborating with others on his research and various other projects. Another principle he applied from martial arts was the importance of regularly training and practicing your skills. This student knew that if he did not stay actively engaged with sociological theory, statistics, writing and teaching, over time he would lose those skills. This student said that his approach to doctoral education radically changed when he applied various martial arts principles to the Ph.D. He recognized that he would have completed the Ph.D. with or without these changes, but he wouldn't have enjoyed or gotten as much out of the experience if he hadn't applied principles from his martial arts to his doctoral education.

*6.4.13 Advisor*

The student participants had varying experiences with their advisors and they found their interactions valuable in different ways. Overall, however, the students said that their advisors provided "general" research guidance. More specifically, this included initial assistance with methods and statistical computations and then later on with writing (*coaching*). One of the observations that several of the students made was that, throughout the course of their studies, they had to adjust to a different working relationship with their advisors than what they had expected. These students said that they expected to receive ongoing feedback from their advisors regarding their work. Instead, they had to learn that they had to be largely independent in doing their work, finding their resources and making decisions on their own. Once they had done this, then they would be able to seek feedback from their advisors.

*6.4.14 Dissertation committee members*

The students gave a few examples of how their dissertation committees contributed to their development as researchers. The students said that overall their committees guided their dissertations, at times helped them with their data analysis, and also provided feedback on their writing (*coaching*). Overall, the students observed that their committees would regularly make recommendations, but then they would provide little guidance on how to implement those recommendations. As a result, students described how the limited oversight gave them the sense that they were largely on their own. One student said this of his experience with his committee members:

> The committee members are still considering you in some ways incapable. You haven't been tested and you don't really know what you're doing. Yet, they expect you to be acting and producing as if you are 100% capable.

Only one of the students discussed the role that some of his committee members had on his professional development. He shared that two of his committee members had taken him around at different conferences and introduced him to whomever he wanted to meet.

*6.4.15 Faculty*

While students received guidance from their advisors and committee members, several students also talked about gaining research skills from other faculty members. Students said they initially met these faculty members in their classes or through their research activities in other departments or centers. Several of these students continued to consult with their former statistics professors on their data analysis and other ongoing issues related to their dissertation. Another student discussed how she was approached by one professor in the department because of their shared interest in a particular research topic and then went on to co-author a paper.

*6.4.16 Peers*

The students interviewed regularly brought up interactions with their peers as useful in learning how to do research. Generally the students said that they often sought out their peers for advice about different aspects of their research. However, it seemed more common among the students interviewed to have at some point organized student groups for various purposes. For example, one student formed a reading group in the department in order to read and discuss literature on a topic that was not well represented in the department. This student said the reading group was essential to her understanding of the literature that was central to her research topic (*articulation, exploration*).

Two additional students discussed forming a small student group with more advanced peers while working on their prospectus. One student commented that working with students who were slightly ahead of him was beneficial because he was able to learn from their experiences (*modeling*). The other student became part of a writing group, again with more advanced peers that regularly met to share their work and talk about their progress. This student found the group to be helpful because they provided each other with feedback and helped to keep each other on track (*coaching*).

*6.4.17 Independent learning*

One of the common modes of learning discussed by the students was independent learning. As discussed above, students would regularly be given general guidance by their advisor and/or committee members but were then expected to figure things out on their own. While students might seek the help of faculty members or their peers, often they had to develop strategies of how to learn things on their own. One student said that one of the ways she learned how to do research was by reading books on how to do

research (*modeling*). Another student discussed looking at other people's research and "mimicking" the things she liked about it (*modeling*). Another student looked for common principles driving the way people did research and then adopting and modifying them for her own purposes (*reflection*). Finally the students said that they regularly watched what others did and tried to model their behaviors after them. A common example given by the students was observing presentations at conferences and learning what to do and even what not to do (*modeling, reflection*).

Although some of the students did not think this was the most effective way to learn how to do research, others said that the only way to learn how to do research was by "doing it" and through "trial and error." As one student put it,

> Once you get past the master's level, it's about you. You make it happen. And if you don't make it happen, then it doesn't happen.

Some of the students found the independent learning useful because it gave them the opportunity to try out a lot of different things and figure out what they liked and what they didn't like. One student reported that a major strength of the Sociology Department was that when she ran into a problem she wasn't automatically given the solution by the faculty around her. Instead, there was an expectation that she would figure things out as much as possible on her own. She said that this culture taught her how to self-teach and how to be independent (*exploration*). For this student, and for a few others, being able to figure things out on their own improved their self-confidence in their ability to do research.

*6.4.18 Apprenticeship relationships*

Among the students interviewed, five of the students characterized having some type of apprenticeship relationship during their doctoral studies, although these varied by student. One of the students had a fairly traditional, research based apprenticeship relationship with his co-advisors. Upon entering the Ph.D. program this student was able to join their research project, which was just getting started. As a result, he worked on this project throughout his studies and described being an apprentice to his co-advisors' research style. Although he would go quite a bit of time without seeing his co-advisors, they guided his research without directing his every move or showing him how to do everything. Another student also described his doctoral experience as an "extended apprenticeship" where he was "learning by doing." He said his RAship was not that different from a carpenter's apprenticeship. Unlike the first student however, this student reported being an apprentice to several different people (e.g., supervisor, advisor, and other faculty members) at different points in his program.

The third student said that some of her most productive interactions had been one-on-one conversations with various faculty members. This student described these interactions as apprenticeships because they focused on her research. She also reported experiencing another type of apprenticeship which involved watching what others were doing and learning through her observations. Overall, her apprenticeships had been short-term, focused interactions or observations with senior scholars.

The fourth student said that she had an apprenticeship relationship with her first advisor because she worked on her professor's research project. Unfortunately this professor left State University and this student hasn't had an apprenticeship since. For this student, an apprenticeship relationship was made possible through a research project

where the student could work closely with a faculty member and a larger research team, at least for a while.

The final and fifth student who identified having an apprenticeship relationship said that it had been with her RA supervisor in an agency outside of State University. This student said initially she thought apprenticeships were only applicable to those students who were planning on becoming faculty members. Because she had chosen another route, she did not believe that she could be an apprentice to any of the faculty members in the sociology program. However, her supervisor outside of the university helped her to expand her skill set, her publication list, and provided her with career advice on non-academic jobs. As a result, she characterized her relationship with her as an apprenticeship.

The remaining two students had different reasons as to why they did not have apprenticeship relationships during their doctoral education. The first student said that her expectation of an apprenticeship was that it was someone younger learning from someone who was older and more experienced. Through the apprenticeship relationship the student would "grow" and eventually become the mentor's peer. Another feature of an apprenticeship relationship to her is that it be continuous throughout the Ph.D. In addition to these criteria, this student believed that she did not have an apprenticeship relationship with anyone in the department because nobody shared an interest in her research topic. Although there were people along the way who helped her with different aspects of her research, these relationships were not long-term or personal and therefore not apprenticeship relationships to her.

The final student did work closely with his advisor throughout his studies, but he did not believe that their relationship was best described as an apprenticeship. The reason for this is that his understanding of apprenticeship implied a hierarchy that did not exist between him and his advisor. He described their relationship as collegial like a peer or mentoring relationship. In their relationship his advisor treated him like he was competent and provided feedback to the extent that it was needed. This student was completely satisfied with the support he received and did not regret that he didn't have an apprenticeship relationship.

## 6.5 Discussion-Apprenticeship model in the Department of Sociology

The conceptual model developed for this study integrates literature from adult learning theory, job markets, professional education, and schooling in an effort to understand how doctoral students learned to do research in their fields. The following section examines the extent to which apprenticeships facilitated students' learning of how to do research in the Department of Sociology.

### *6.5.1 Community of practice*

The faculty members and doctoral students interviewed from the Sociology Department had different takes on apprenticeship relationships in doctoral education. However, the one common characteristic across them all was that apprenticeship relationships were developed around research projects and a shared interest in a particular research topic. All of the faculty members referred to apprenticeships in the context of funded research projects. Similarly, the students referred to apprenticeships as "research apprenticeships" which either took place in a funded appointment or were short-term focused interactions with or observation of senior scholars. For most of the students the

"research apprenticeship" was typically with more than one person but was most common with faculty or supervisors who had extensive research experience and who were able to provide expertise and emotional support.

It is interesting to note that the faculty members and doctoral students referred to apprenticeships as focused on quantitative research and not on other activities like teaching or service. The focus on research is indicative of the overall culture of the Department of Sociology at State University. A community of practice is comprised of people who are mutually engaged, have a joint negotiated enterprise, and a shared repertoire (i.e., routines, tools, ways of doing things, etc.) (Wenger, 1998). In the Department of Sociology, all of the faculty members and doctoral students were engaged with the domain of sociology and conducting research on the social world primarily using a quantitative approach. As a result, the data suggests that the Department of Sociology represents a community of practice focused on sociology as the practice of quantitative social research.

Every faculty and student interviewed commented on the quantitative focus of the department. From the very beginning of their program, students were required to complete rigorous statistical training and many of the students proceeded to get a minor in social statistics. Throughout these courses, students and faculty members worked together, shared information, and engaged in discussions about social statistics. This led to the building of apprenticeship relationships between students and faculty members.

Another joint activity in the Department of Sociology that was related to research practices was department seminars. These gatherings, in which outside scholars, sociology faculty members, or students presented research, provided an opportunity for

the community to come together to talk about research. Although these gatherings only occurred a few times a quarter, they helped promote a culture of research focused on social statistics.

The sequence of courses and the department seminars provided opportunities for students and faculty to regularly engage in discussions and learn from each other. During the interviews students demonstrated that they had both learned about the discipline and the research being done in the department (primarily quantitative), while at the same time helping to make the field their own and re-define it. For example, one student who had no intention of working in academia took what she learned and reframed it to be applied to a context outside of the university.

The final characteristic of a community of practice is a shared repertoire of resources, tools, and ways of addressing recurring problems; in other words, a shared practice. The interviews with faculty and students showed that the collective purpose of the department was to provide a common definition of sociology and to train students to become quantitative sociology researchers. Social statistics became a shared practice in the department even though people were looking at a broad range of topics. Although the faculty might argue that the rules and practices involved in social statistics were absolute and did not change, the style in which they were taught and the interpretations that were made from data were influenced by the faculty and students in this department. For example, when faculty talked about the need to make certain decisions and compromises when conducting quantitative research, the values of both the faculty and students were mutually shaped and informed to some extent by the shared practice of the department.

Overall, there was substantial evidence from the Department of Sociology that the department itself represents a community of practice that is focused on sociology as a quantitative enterprise. Every faculty member and student interviewed took pride in the excellent preparation and engagement they had with the enterprise of quantitative sociological research. As articulated by Lave and Wenger (1991), apprenticeship learning occurs in a community of practice when students move from the periphery of the community to the center and become more involved in the everyday practices of that community. This was clearly facilitated through students' interactions with senior scholars like their advisors and other faculty members. Although students referred to their peers as valuable resources in their learning and development they did not identify those relationships as apprenticeships.

*6.5.2 Apprenticeship type*

The next feature in the conceptual framework developed for this study is the differentiation between different types of apprenticeships (Sullivan et al., 2007). There was some indication from the interview participants that apprenticeship relationships did focus on different activities such as data analysis or writing, but the primary differentiation made around apprenticeships in the Department of Sociology was that they were primarily research apprenticeships. In addition, the students described variation in terms of duration, ranging from long-term apprenticeship relationships to short-term apprenticeship interactions.

*6.5.3 Cognitive apprenticeship tools*

The third and final feature of the conceptual framework focuses on the utilization of cognitive apprenticeship tools to facilitate apprenticeship interactions. All of the

students provided multiple examples of cognitive apprenticeship tools (Collins, 2006) in their discussions of how they learned to do research. One of the most prominent teaching methods used was *modeling*. The students generally described learning from faculty members in the classroom, learning from others in their RAships, and watching others at conferences and department seminars. For example, when watching someone else present their work they were being exposed to some of the cognitive processes or decisions the researcher had to make in order to complete their research. At the same time, students demonstrated modeling when they referred to completed dissertations or published journal articles to inform their work.

*Coaching*, or bringing a student's performance closer to that of an expert, was most evident in the classroom, when the students received help on their master's thesis, in students' RAships, at conferences, and from students' interactions with faculty members, advisors and committee members. *Articulation*, explicitly stating knowledge and reasoning about problem solving processes, occurred through subject area exams, through the prospectus and general exam, and when the students had the opportunity to present at professional conferences, or at department seminars. There were also three opportunities for *reflection* in which students were able to compare their own problem solving processes with those of an expert or advanced student: attending professional conferences, and department seminars.

There were a few examples of *scaffolding,* in which students were supported while they carried out a task. The first of these was the careful sequencing of the social statistics core courses by the department. These classes intentionally built upon each other and the faculty members from these classes were resources to the students who

were interviewed throughout their tenure in the program. Another example of scaffolding by the department was the master's thesis, which was designed to expose students to the research process and writing a journal article that then prepared them not only for going on to complete their dissertation but also to publish. *Exploration,* or guiding students to be able to problem solve on their own, was especially evident among many of the students who, while working to complete the program requirements (i.e., master's thesis, subject area exams, dissertation prospectus, and dissertation), were either encouraged to problem solve on their own or were left to figure things out.

Overall, apart from the professional conferences and the department seminars, the bulk of the cognitive apprenticeship teaching methods were evident in the formal Ph.D. requirements of the program. There did appear to be some differences in the types of methods used by faculty versus peers. For example, faculty members (including advisors and committee members) seemed more likely to utilize coaching and modeling with their students. Although there was some modeling from peers, the students provided more examples of exploration and articulation in their interactions with their peers.

In sum, there is a significant amount of evidence to suggest that much of how students learned how to do research in the Department of Sociology was facilitated by apprenticeship relationships. In relation to the conceptual framework, the apprenticeship model in the Department of Sociology could be represented in the following manner.

Table 14

*Apprenticeship Model in the Department of Sociology*

| | |
|---|---|
| Continuum of apprenticeship relationships | There was a spread of apprenticeships across the students' experiences. These apprenticeships ranged from more long-term and traditional (with co-advisors), to more short-term interactions with multiple people (primarily faculty members or advanced scholars). The department represents a community of practice around sociology as a quantitative enterprise. |
| Apprenticeship types | The primary type of apprenticeship identified is a "research" apprenticeship. Specific examples of content included data analysis and writing. |
| Cognitive apprenticeship tools | Cognitive apprenticeship tools mediate apprenticeship relationships:<br>• *Modeling*-In the classroom, RAships, department seminars and conferences, looking at completed dissertations or published journal articles,<br>• *Coaching*-In the classroom, RAships, supervisory committee<br>• *Scaffolding*-Social statistics core courses<br>• *Articulation*-Subject area exams, prospectus defense, and presenting research at department seminars and conferences<br>• *Reflection*-Looking at completed dissertations or published journal articles, attending department seminars and conferences<br>• *Exploration*-Master's thesis, subject area exams, prospectus defense, dissertation |

*6.5.4 Other observations*

As an outsider to this community there are several observations that I would like to make. The first is that, once all of the students were on board with the quantitative focus of the program (some didn't realize this when they started the program), it served to unify the students into a cohort and it provided a source of pride and confidence among the students. Students quickly learned that they had a valuable commodity because they were highly sought after for RAships in other academic units and because graduates were very competitive on the job market. At the same time, all of the students recognized that they were getting a "narrow" view and training in sociological research. For most of the students this wasn't a problem. In fact, one of the students was using a mixed-methods approach in his dissertation with the support of his advisor and two of his committee members who were from another department. However, another student, who wanted to use a mixed-methods approach, was not allowed to do so by her committee. One of the faculty members interviewed wished that there were more qualitative research courses for the students to take because she believed students were not well balanced and would have benefited from more diverse training. While everyone viewed the focus on quantitative research as an asset, it was at times at the expense of a broader appreciation for qualitative methods.

Second, even though students were well prepared to employ statistical analyses, many of them struggled with several of the other aspects of the research process. One student, for example, said that after completing all of her statistics classes she had no idea where to find data. Other students talked about struggling with how to come up with a research question. While there was significant training in social statistics, the students

reported that the more general research methods courses were not helpful in preparing them to do research.

All of this speaks to the culture of the Department of Sociology and how it practices doctoral education. All of the students said that, eventually, they realized that they had to figure things out on their own because no one was going to tell them exactly what to do. This was true regarding their actual research and the formal requirements of the program. Some of the students said that they actually preferred to go off and figure things out on their own instead of asking someone else. However, several of the students did wish that they had received more guidance from their advisors and committee members. It took many of the students quite a while to realize that they were expected to learn things on their own, make decisions about their work, and then seek feedback.

If students are expected to be independent learners who seek and learn information on their own then the department and its faculty members need to make this expectation explicit. It seemed that the faculty interviewed preferred not to teach students directly, but instead to guide their students more indirectly. While the group of students that I interviewed had figured this out, I wonder if all students in the program are able to come to this realization. We know from the work of Lovitts on attrition (2001) that students who do not get the information they need, fail to develop clear coherent cognitive maps, which are necessary for successful completion of the Ph.D.

**6.6 Summary**

In the Department of Sociology there is a community of practice around sociology as a quantitative enterprise. Within this community students are engaged in a range of research apprenticeship relationships. This includes a more traditional, long-term

relationship with one or two faculty members to more short-term interactions. Finally, individual cognitive apprenticeship tools mediated students' learning primarily through individual department-based activities.

# Chapter 7

## Cross-Department Analysis

The previous three chapters provide a comprehensive description of the context and the structure of three doctoral programs in Bioengineering, Comparative Literature, and Sociology. In this chapter, I juxtapose the formal requirements and informal activities and discuss some of the variables that likely influenced the variations across the three fields. I then discuss how the findings provide a more general understanding of the apprenticeship model in doctoral education. Next, I analyze the importance of independent learning by students across the three programs. Finally, I revisit the conceptual framework developed for this study and propose some revisions in response to my observations of participants' experiences.

My primary argument in this chapter is that the findings show that we need to expand the apprenticeship model so that it goes beyond the one-on-one dynamic between a student and an advisor to acknowledge that doctoral students learn from multiple individuals throughout their Ph.D. experience.

### 7.1 Formal requirements reflect disciplinary culture

As was expected, the formal requirements and informal activities of each department are largely reflective of how research or advanced work is done in these fields. Although there is a minimum group of requirements required by every graduate school, beyond that, faculty members in each department are free to add to and interpret these requirements as they deem appropriate. To look at the differences more closely, Table 15 juxtaposes the formal requirements and informal activities of the three academic departments in this study.

Table 15

*Illustration of the Formal Requirements across the Three Academic Departments*

| | Bioengineering | Comparative Literature | Sociology |
|---|---|---|---|
| Research assistantship | • Primary mode of funding<br>• Multi-year<br>• Students' dissertation research emerges from larger project | • Lack of RAships | • Preferred mode of funding<br>• Year-to-year<br>• Mostly independent of students' dissertation research |
| Teaching assistantship | • Lack of TAships | • Primary mode of funding<br>• Majority of appointments in other departments, some in Comparative Literature Department | • Primary mode of funding<br>• Majority of appointments in Sociology Department |
| Coursework | • Minimum of 90 post-baccalaureate credits<br>• Moderate number of required courses | • Minimum of 90 post-baccalaureate credits<br>• No required courses<br>• Minimum of 30 credits in department | • Minimum of 90 post-baccalaureate credits<br>• Large number of required courses |
| Qualifying exam | • Mock grant proposal<br>• Written and oral<br>• Must be taken before the end of 2nd year in Ph.D. program | • Three written examinations<br>• Written and oral<br>• Must complete all coursework and language requirements (four-five years post MA) | • Subject area examinations consisting of major and minor<br>• Written<br>• End of fourth year if entered pre-MA |
| General exam | • Plan of research<br>• Written and oral<br>• One year after qualifying exam or three quarters before dissertation exam | • Dissertation prospectus<br>• Written<br>• Must be completed three months after qualifying exam | • Dissertation prospectus<br>• Written and oral<br>• After coursework is completed |
| Dissertation | • Original and independent investigation of a problem | • Original and independent investigation of a problem | • Original and independent investigation |

Part of the variability can be understood in terms of the interdisciplinarity of each field. Bioengineering, for example, generally draws from engineering, biology, and medicine to solve biomedical problems with engineering principles, tools, and techniques. Similarly, many of the theories and methodologies used in comparative literature are drawn from other disciplines in the humanities. Sociology, at State University, was the least interdisciplinary among the three departments, although as a field in the social sciences it draws from theories and methodologies that are used across other social science fields.

While each department had interdisciplinary characteristics some of the students had more opportunities to engage in interdisciplinary activities. For example, the students from Comparative Literature regularly crossed disciplinary boundaries for their coursework, teaching, and to attend other department seminars. The interdisciplinary nature of the field also provided students with a lot of freedom in the selection of their dissertation topics.

In bioengineering, students crossed disciplinary boundaries in their coursework and in their dissertation research. Furthermore, there was a wide range of research being conducted across different lab groups. Faculty and students talked about the existence of two categories of labs in the department: (1) wet-lab research groups, and (2) computer/simulation groups. Although students were primarily affiliated with one lab, they were regularly exposed to the diversity of research topics and methodologies utilized across the department.

Interdisciplinarity has been defined as the integration of disciplinary methods and theories for the purpose of solving complex problems (Klein, 1996; Lattuca, Voigt &

Fath, 2004). Given the scope of the work being conducted in Bioengineering and comparative literature, the interdisciplinary nature of these fields provided students with some valuable learning opportunities. Specifically, students were exposed to a broader range of epistemologies, or ways of knowing. This exposure likely helped the students to understand not only the limits of other disciplines, but also the limits of their own discipline (see for example Pallas, 2001). Additionally, interdisciplinary interactions helped students to learn how to communicate effectively with people from different fields.

**7.2 Funding mechanisms have different impacts on students' development**

One of the key factors that impacted how doctoral students learned how to do research was the funding mechanisms of research and teaching assistantships. The Department of Bioengineering, for example, relied on research grants to fund faculty members' research, and faculty members then relied on doctoral students and other lab members (e.g., undergraduate students, post-docs, and research scientists) to complete the objectives of the research project. Doctoral students in bioengineering received funding through RAships, typically for the entire duration of their studies, and they contributed to their advisor's research project, while also completing their own dissertation project. In the Department of Bioengineering, the laboratory served as the primary site for learning how to do research. The interactions that doctoral students had with other lab members while working on their advisor's research, and their own, were fundamental in facilitating students' learning. The laboratory served as a primary community of practice for students and they engaged in short-term apprenticeships with various other lab members.

In the Department of Sociology, a few of the faculty had research grants to fund research and hire their doctoral students. Sociology students also obtained RAships in other departments across the university; but these were mostly year-long appointments that did not directly contribute to the students' dissertation research. Overall, the students from sociology, who had the opportunity to work as research assistants, benefited from the training they received in their research groups. These research groups served as a community of practice for students and they engaged in apprenticeship moments with other members of them.

Only one student from the Department of Comparative Literature reported receiving one year of funding as a research assistant from the department. In this role, she helped different faculty with their advanced work and also helped to organize a student-led interdisciplinary conference. She reported that these activities taught her mainly what to do when publishing a book and how to run a conference.

This study demonstrated that students who received funding as research assistants benefited significantly from being exposed to the research process. Across these communities of practice, students learned how to use various disciplinary research tools and they were provided with the necessary support to become active participants in their respective research communities (see also Weidman, 2010). Furthermore, these experiences provided students with the opportunity to work with others, to observe others, and to practice and develop research skills in an authentic research project. Not only did these research assistantships provide students with funding, but they also served as valuable learning experiences.

Teaching assistantships were the primary funding mechanism for doctoral students in both comparative literature and sociology, because these departments relied on doctoral students to teach their undergraduate students. In sociology, all of the students were awarded teaching appointments within the department. Comparative literature had fewer undergraduate classes and therefore had fewer teaching appointments. As a result, students had to be rotated through appointments in the department. In order to fund students for the remainder of the time, students were awarded TAships in other language departments. None of the students in bioengineering were awarded teaching assistantships, although, in subsequent cohorts, all doctoral students were required to TA at least one undergraduate course.

Although the majority of the faculty and students who were interviewed did not recognize TAships as positively contributing to students' development as researchers, for some of the students it did. A few students recognized that their teaching assistantships had helped them to develop more effective persuasion and argumentation skills. Students who had the opportunity to teach and develop their own course(s) and/or assist with a class that was closely related to their dissertation topic, discussed how these experiences significantly impacted their development as researchers and scholars. Through these experiences students had to: (1) learn more about the subject they were teaching, (2) learn how to creatively present their content, and (3) overcome their fears around speaking in front of large groups of students. One student even discussed collaborating with one of his students on a research project which led to presentations and publications.

This study showed that while teaching assistantships might not generally be viewed as pedagogical tools for the development of researchers, they in fact can provide

doctoral students with skills that are applicable to their research and development. Wulff et.al. (2004) conducted a four-year longitudinal study on how doctoral students' develop as teachers, and what they came to understand is that students' development as teachers was embedded in all areas of their development which included becoming a researcher. In other words, students' development as researchers, scholars, and teachers were deeply connected and mutually informed and shaped each other. Based on the findings from this study, I also conclude that teaching assistantships can help doctoral students develop not only as teachers, but also as researchers and scholars.

## 7.3 The apprenticeship model in doctoral education

A key goal of this study was to move away from our anecdotal understanding of the apprenticeship model in doctoral education to a more evidence-based understanding of what apprenticeships look like in three doctoral programs, spanning very different disciplines, at one university. The conceptual framework developed for this study integrated models of apprenticeship relationships, types, and tools, in order to analyze the findings.

### 7.3.1 Communities of practice

One of the first major findings to emerge around apprenticeships was that, across the three departments, multiple individuals played a role in students' development as researchers. Although we have known that the advising relationship is important to the success of doctoral students (Baird, 1995; Etkowitz et al., 2000; Golde & Dore, 2001; Lovitts, 2001, 2004; Nettles & Millett, 2006), this study showed how committee members, other faculty members, peers, post-docs, and research scientists also engaged in apprenticeship relationships with students and played a key role in how doctoral

students learned to do research. These findings are similar to those identified by Walker et al. (2008) in which they showed that students relied on many different mentors throughout their doctoral studies. Although the degree to which any one of these relationships influenced students' development varied across the three departments, it reinforced the idea that *students do learn from multiple people through apprenticeship relationships in doctoral education*. The academic departments served as the primary communities of practice for the students in this study.

*7.3.2 Cognitive apprenticeship tools*

The second major finding, in regard to the apprenticeship concept, is that there was substantial evidence of cognitive apprenticeship tools being used in these apprenticeship relationships. In other words, *apprenticeship relationships were facilitated by concrete teaching strategies (cognitive apprenticeship tools) that helped to make the process of research and advanced work more transparent to students*. There were differences, in how these tools were utilized. Table 16 illustrates some examples of how these tools were expressed across the three departments in this study.

Table 16

*Illustration of the Cognitive Apprenticeship Tools used across the three Academic Departments*

| | **Bioengineering** | **Comparative Literature** | **Sociology** |
|---|---|---|---|
| Modeling | Observing others, professional conferences, mini-grant proposal | Attending a lecture in another department, showing students how to do close readings of text in the classroom | RAships, department seminars and, looking at completed dissertations |
| Coaching | Feedback in laboratory and on class assignments | General exam, writing groups | In the classroom, RAships, supervisory committee |
| Scaffolding | Mini-grant proposal | Dissertation prospectus | Social statistics core courses |
| Articulation | Presenting research in lab meetings, informal interactions | General exam and professional conferences | Subject area exams, prospectus defense, and presenting research |
| Reflection | Lab meetings, department seminars, conferences | Department seminars and professional conferences | Attending department seminars and conferences |
| Exploration | Dissertation research | General exam, prospectus, dissertation | Master's thesis, subject area exams, dissertation |

*7.3.3 Duration of apprenticeship relationships*

A third major finding from this study was that there was variation both across and within the three departments in the duration of different apprenticeship relationships. In a traditional or classical apprenticeship relationship, a key feature of that interaction is that it is sustained over a long period of time. However, this study showed that the majority of students did not engage in long-term apprenticeship relationships during their doctoral studies. *Instead, students experienced a range of apprenticeship relationships that went from long-term sustained interactions with one or two people to short-term, apprenticeship moments, with multiple different individuals.* Even though there was variation in the duration of these apprenticeship relationships, the students did not indicate that the quality of these interactions, or the content learned was negatively impacted. The students who described engaging in more short-term interactions with others said that these helped them to advance their development as researchers or scholars in meaningful ways.

*7.3.4 Differentiation of apprenticeship types*

*The fourth major finding in this study was that students experienced different types of apprenticeship relationships*. In the initial conceptual framework, different types of apprenticeships indicated different aspects of professional expertise and pedagogical intention (Sullivan et al., 2007). This differentiation reflected the possibility that apprenticeship relationships in doctoral education might cover a range of topics. Several students talked about engaging in apprenticeship relationships that were focused on very specific activities, while other students identified more general types of apprenticeships.

For example, in the Department of Comparative Literature some of the students discussed engaging in short-term apprenticeship relationships that were focused on "teaching and writing."

In the Department of Sociology, the majority of the students defined their apprenticeships as "research" apprenticeships in which they focused on a broad range of research activities. Similarly in bioengineering, students also described engaging in research apprenticeships, but some of the students differentiated this further by characterizing these as "thinking" and "doing" apprenticeships. Thinking apprenticeships, typically occurred with advisors and committee members, and these relationships focused on broader conceptual issues related to their research. Doing apprenticeships typically occurred with different lab members and focused on the nuts and bolts of every-day research activities. The distinction between "thinking" and "doing" apprenticeships is similar to the intellectual or cognitive, and skills-based apprenticeships, identified by Sullivan et al. (2007).

*7.3.5 Is every relationship an apprenticeship?*

Based on the findings, it may appear that every single interaction described by the doctoral candidates in this study could be considered an apprenticeship relationship. However, it seems that there are two important features that need to be present in order for a relationship or interaction to be an apprenticeship. The first is that, the mentor has to be more advanced than the student and have some expertise on a particular topic. While it is possible that a more immediate peer could serve as a mentor, it is more likely that students will engage in an apprenticeship relationship with more advanced peers, post-docs, and faculty. The second feature that distinguishes an apprenticeship relationship from other interactions is that it must be focused on some particular tool or task. In other words, the interaction is purposeful in trying to convey to the student what he or she needs to do in order to master a tool or task. As illustrated by the students in this study, this can occur in one meeting or it can be a more long-term interaction that covers a wide range of tools and tasks.

### 7.4 The role of independent learning

While examining the role of formal requirements and informal activities on doctoral students' development as reserachers and scholars, one major finding that emerged was the role of independent learning. Although there were different motivations for this, all of the students in this study referred to independent learning as one of the key ways they had learned to do research. For example, while there was evidence of students' learning through apprenticeship relationships with others, their learning did not cease once those interactions had ended. Several students discussed how they had to go off on their own and continue practicing a new technique. Or in some cases, students reported that they would pretend to know something in the company of others, but then would go off and learn about it on their own. Some students were directly told by an advisor, committee member, or faculty member that they needed to do X, but were expected to find someone else to help them or to learn it on their own.

While it may seem obvious that each doctoral student would need to do a significant amount of learning and processing on their own, the student participants were very explicit about the amount of independent learning they had to assume. It was as though they had come to this realization, not necessarily at the beginning of their program, but at some point during their doctoral education. In some ways, there was almost an element of surprise on the part of the students around how much independence was needed to successfully move through their program.

Although the initial conceptual framework illustrated the relationship between students' development and the context of the doctoral education learning environment, independent learning was not fully captured. One body of research that theorizes around independent learning, but which is rarely integrated into research on doctoral education (one exception is

Kasworm & Bowles, 2010), is adult learning theory. I believe one of the reasons why it is rarely included is because many people in the U.S. continue to link adult learning theory with remedial adult education and training. However, there are some key adult learning principles that are particularly useful around the role of independent learning.

Over forty years ago, Malcolm Knowles made efforts to distinguish adult learning from pre-adult schooling and he articulated these differences in what he called an andragogical model or theory of adult learning (1968). In his model he identified five andragogical assumptions of the adult learner:

1. As a person matures his or her self-concept moves from that of a dependent personality toward one of a self-directing human being.
2. An adult accumulates a growing reservoir of experience, which is a rich resource for learning.
3. The readiness of an adult to learn is closely related to the developmental tasks of his or her social role.
4. An adult is more problem centered than subject centered in learning.
5. Adults are motivated to learn by internal factors rather than external ones.[21]

The first assumption speaks directly to the role of independent learning that emerged from this study. Students entered their Ph.D. program being more dependent on others and then moving through the stages of their program they became more self-directed in their own learning.

Although all of the students recognized needing to become independent learners, they had different experiences which led them to this realization. For example, some students described how their advisor or committee members would tell them to do something, but not provide any additional guidance. Other students described not having much direction at all and

[21] Adapted from Merriam & Caffarella (1999).

how they needed to become independent learners because no one was guiding them. Although more research would be needed to understand the impact of such different experiences on one's conceptualization of independent learning, this study showed that becoming an independent researcher or scholar was contingent on students becoming independent learners.

## 7.5 Conceptual framework revisited

### *7.4.1 Value of the framework*

The conceptual framework developed for this study integrated aspects of adult learning theory, craft labor, professional education, and schooling. One concept in the framework that was particularly useful in the analysis of the data was the continuum of apprenticeship relationships. The continuum between a traditional apprenticeship (one advisor and one student) and legitimate peripheral participation (involving multiple individuals) in a community of practice, was critical in capturing the range of apprenticeship relationships that the students identified. Additionally, it helped to show that for those students who reported not having any apprenticeship relationships, they were defining apprenticeships as a long-term close relationship between a student and an advisor. The findings from this study support a much broader conceptualization of apprenticeship relationships.

Not only does the literature on doctoral education over emphasize the importance of the advisor-student and student-committee relationships, but so do the various stakeholders of doctoral education: faculty members, department chairs, graduate schools, professional associations, etc. While these relationships are important to the success of doctoral students, students also need to recognize that their advisor cannot possibly provide them with everything they will need in order to be successful (see also Nerad, 1995). Other researchers (Golde & Dore,

2001; Nyquist & Woodford, 2000) have similarly recognized this, and have encouraged doctoral students to be more proactive about seeking out other mentors according to their needs.

A current challenge in shifting students' perspectives is that because graduate schools and academic departments require students to have an advisor and supervisory committee, students are more likely to focus all of their attention on these relationships and may not recognize how other individuals are also critical to their development as researchers and scholars. This is not to undermine the important role that advisors and committee members play in students' experiences. However, by reframing the learning environment as a community of practice in which legitimate peripheral participation facilitates students' learning, students might better understand the role of their department in helping them to acquire the broad range of skills needed to become independent researchers and scholars (see also Kuwahara, 2008).

*7.4.2 What is missing from the framework?*

Two major findings in this study were not well-represented in the conceptual framework: (1) the duration of an apprenticeship relationship, and (2) the role of independent learning. As mentioned before, traditional apprenticeships are generally characterized as long-term relationships. However, in a community of practice, there is no clear articulation of the length of the apprenticeship relationships facilitated through legitimate peripheral participation. In other words, it is possible that the novice could experience both long-term and short-term apprenticeship relationships with different members of the community. This study showed that short-term apprenticeship moments were equally important and valuable to students.

In order to address this variabilty, I have revised the continuum of apprenticeship relationships in order to include all of the different features of apprenticeship relationships

identified in this study (the number of individuals a student may apprentice with, and apprenticesip types), adding the variation in duration. (*Figure* 4).

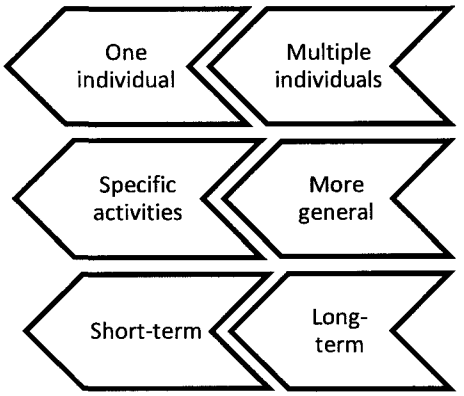


*Figure 4.* Revised features of apprenticeship relationships

The role of independent learning in students' development as reserachers and scholars was also not well-captured in the initial conceptual framework of the apprenticeship model. The revised conceptual framework (see *Figure* 5) places more emphasis on the individual doctoral student and the role of independent learning, recognizing that it is the student who has to move through a developmental process that involves becoming an independent learner before becoming an independent researcher. Additionally, the department is recognized as a community of practice in which a doctoral student may engage in apprenticeship relationships with a wide range of individuals as illustrated in this study (e.g. advisor, committee members, other faculty members, peers, and lab mates).

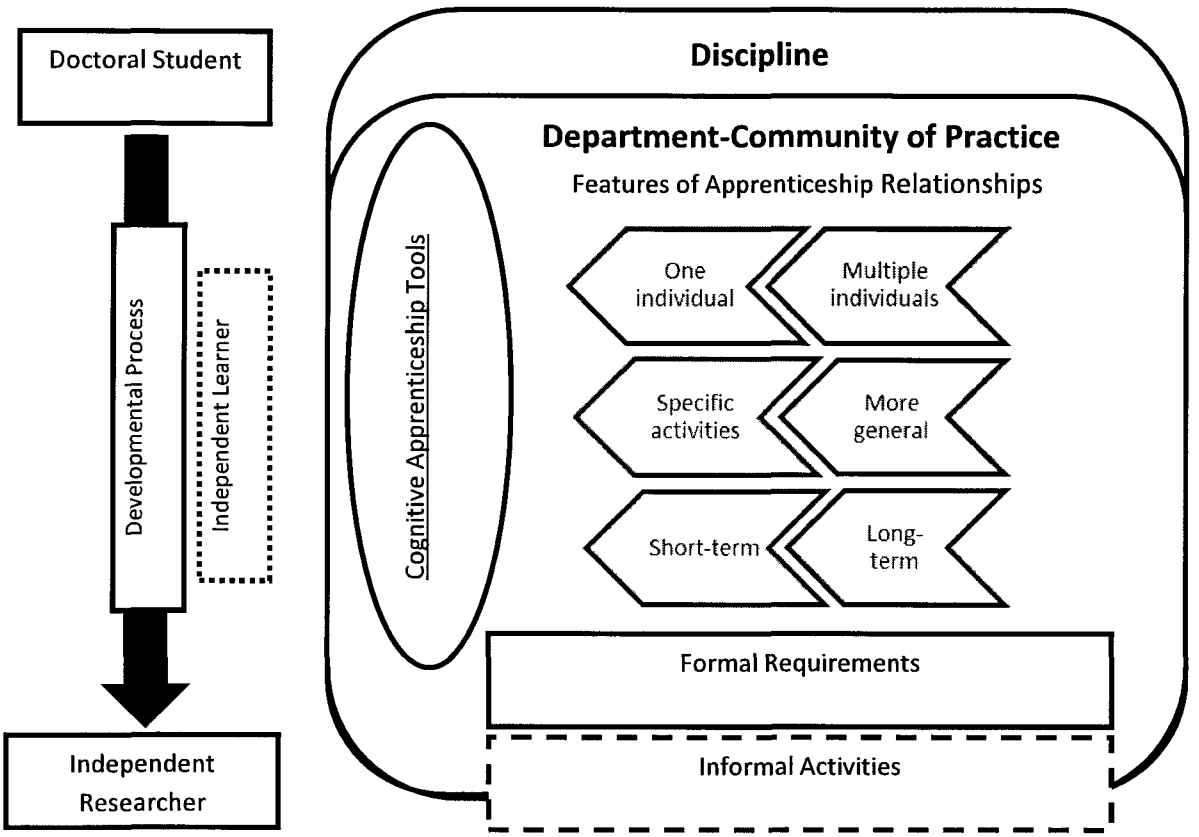


*Figure 5.* A revised conceptual framework of the pedagogy of research in doctoral education and the apprenticeship model

# Chapter 8

# CONCLUSION

## 8.1 Findings

The purpose of this qualitative study was to examine how doctoral students from three academic departments at one research university learned to do research. To address this larger question, I examined the formal requirements and informal activities of each program and looked for evidence of apprenticeship relationships. The key findings are described below:

1. The formal requirements and informal activities in each academic department reflect how research and advanced work is conducted and disseminated in these fields.
2. Research assistantships served not only as a funding mechanism for students, but also helped to teach students how to do research in their field.
3. Although teaching assistantships were generally not viewed as useful in the development of researchers or scholars, some students acquired skills that contributed to their development.
4. Students developed as researchers and scholars through apprenticeship relationships with multiple individuals: advisors, committee members, other faculty members, researchers, post-docs, and peers.
5. Apprenticeships varied in duration from long-term to short-term interactions.
6. There are several different types of apprenticeships and some may be focused on very specific activities ("teaching," "writing," "thinking," and "doing"), while others may be more general ("research").
7. Cognitive apprenticeship tools (modeling, coaching, scaffolding, articulation, reflection, exploration) were used to facilitate apprenticeship relationships in the various

communities of practice and across the different formal requirements and informal activities of the three departments studied.

8. One needs to become an independent learner in order to become an independent researcher.

These findings show that apprenticeship relationships do exist in doctoral education, but that they go far beyond the traditional or classical definition as a relationship between one master and one novice. Instead, doctoral students are engaging in apprenticeship relationships with multiple individuals, around different topics, and for varying durations. This calls for the re-conceptualization of the apprenticeship model in doctoral education, the promotion of communities of practice, and for faculty and departments to help students become independent learners on the path toward becoming independent researchers and scholars.

**8.2 Recommendations for practice**

Although this study was conducted in three departments at one university, these findings may have implications for other faculty, students, and graduate schools. In the following section I provide some suggestions for future practice based on these findings and organize them by relevant stakeholders: faculty members, doctoral students, and graduate schools. These recommendations are further summarized in Table 17.

- The ways in which formal requirements and informal activities contribute to students' development as researchers and scholars should be well-articulated.

*Faculty members*-While faculty members may understand the purpose behind the formal requirements and informal activities of their program, doctoral students often do not. In order to facilitate the transition from dependence to independence, faculty must clearly articulate the

Table 17

*Summary of Recommendations for Practice by Stakeholder*

| Recommendation | Faculty Members | Doctoral Students | Graduate Schools |
|---|---|---|---|
| Purpose of formal requirements and informal activities need to be well-articulated | Clearly articulate purpose and how they contribute to students' development. Periodically revisit relevance and effectiveness of requirements and activities. | Recognize that there is purpose behind each requirement and activity. If it is unclear, students should ask for further clarification. If a student is not satisfied, he/she should modify the experience to make it more meaningful. | |
| Students should be exposed to multiple research projects | Expose all students to the research and advanced work of faculty in the department, especially if funding for RAships is not available. | | |
| Recognize value of teaching assistantships | Identify the skills gained from teaching and discuss with students how these might overlap or translate into research and advanced work skills. | Engage faculty in conversations around how teaching skills translate to research. Students should create meaningful teaching experiences if they find themselves doing "academic grunt-work." | Help departments to identify transferability of skills learned across doctoral education (e.g. research, teaching). |
| Students needs multiple mentors and apprenticeship relationships | Help create and promote the department as a community of practice in which doctoral students are expected to learn from multiple individuals. | Students should not exclusively rely on their advisor for an apprenticeship relationship. It is important to seek out apprenticeship moments around different types of activities and from others. | Talk about a broader definition of apprenticeship relationships in doctoral education and encourage students to seek out assistance from a variety of people. |

| Recommendation | Faculty Members | Doctoral Students | Graduate Schools |
|---|---|---|---|
| Cognitive apprenticeship tools can help facilitate apprenticeship relationships | Faculty should become familiar with these tools, adapt them to their field, and integrate them into their teaching and advising practices. | | |
| Recognize the value of students' external experiences | Develop more systematic efforts to encourage students to draw on their previous and current external experiences and recognize students' development more holistically. | | |
| Becoming an independent researcher requires becoming an independent learner | Provide students with activities that scaffold their learning in order to transition from being dependent to more self-directed. | Ultimately, students are responsible for moving their work forward. Students need to focus on becoming independent learners in order to become independent researchers. | Help communicate to prospective and current graduate students the expectation that students will need to approach their learning more independently. |

purpose of these requirements and activities and their overall function in students' development. This should be done in written documents, like a student handbook, as well as orally at every appropriate opportunity (e.g., orientations, required courses, department seminars). Additionally, faculty members should periodically revisit the relevance and effectiveness of these requirements and activities for future cohorts and make changes accordingly. This reexamination is increasingly relevant given the growing expectations by employers around the skills that graduates should have. For example, graduates are now expected to possess some of the following skills: intellectual risk taking (Forces and Forms of Change in Doctoral Education Worldwide III, 2009) professional competencies (Eggins, 2008; Nyquist & Woodford, 2000), and interdisciplinary skills (Committee on Science Engineering and Public Policy, 1995).

With regard to informal activities, faculty members need to ensure that all students are aware of how important these activities are for students' development as researchers and scholars. Additionally, every effort should be made to make these activities accessible to students. For example, although attending national professional conferences might not be financially possible for all students, departments may consider organizing a local conference in which students could receive some of the same benefits they would by attending a national conference.

*Doctoral students*-All too often, doctoral students view program requirements and informal activities as merely a series of hoops to jump through. Even if faculty members do not express the purpose behind each requirement and activity, doctoral students must attempt to see each experience as contributing in some way to their development as researchers and scholars. If a student does not feel that an activity is meaningful and relevant, they should seek to modify the experience so that it meets their needs. For example, if a student is given an assignment in class

that is too general in scope and content she could instead propose completing a literature review or a conference proposal that would meet her needs as well as the intent of the original assignment.

This study demonstrated that informal activities (e.g., department seminars, informal gatherings, professional conferences) were very important for students' development as researchers and scholars. Although these activities may not be required, doctoral students should make every effort to participate in as many of these activities as possible. For example, attending department seminars will not only expose students to the latest research and advanced work, but also serve as a model for how that work can be presented.

- If funding for RAships is not possible in a department, students should be provided multiple opportunities to be exposed to the research and advanced work of their faculty.

*Faculty members*-RAships are valuable opportunities for students to observe how research is conducted. However, due to funding mechanisms in different departments, not all students are able to participate in RAships. Students, who are not fortunate enough to garner a RAship, should not miss out on these valuable learning opportunities. All students must be provided with the same learning experiences, albeit in other settings. For example, faculty should expose students to their research and advanced work. This could occur in multiple ways. One possibility would be for a faculty member to organize an informal research group organized by topic or methodology, for example, and regularly meet with students to discuss their research activities. Faculty should also collaborate with students around their research or advanced work and co-publish the findings. Faculty could also purposefully and explicitly design course assignments to reflect the different steps involved in conducting research or advanced work.

Although this might already be done, faculty could be more explicit about how course activities translate to the research process.

- Teaching assistantships can contribute to students' development as researchers and scholars.

*Faculty members*-Students would benefit significantly by having faculty reframe TAships from "academic grunt-work," to valuable opportunities to learn how to teach and do research and advanced work. Although some students may come to this realization on their own, more effort needs to be made by faculty to identify the types of skills gained from teaching and how these might overlap with research and advanced work skills. Such conversations should be integrated into current TA training programs in each department. If such training does not exist, then faculty should find opportunities to share how they have successfully been able to bridge their teaching and research activities. Students could also be required, for example, to write a reflection paper at the end of the year on how their teaching impacted their development as researchers and scholars and present it to their peers.

*Doctoral students*-Students need to view their teaching appointments as not only an opportunity to develop as a teacher but, more broadly, as a researcher and scholar. The challenge for students is to recognize that many of the skills acquired through teaching can be translated into research and advanced work skills. I would encourage students to engage their faculty supervisors and advisors in conversations around the link between research and teaching, and how they can transfer across different activities. If students find that their TAships consists primarily of "academic grunt-work," they should ask if it is possible to teach one class or do a special lecture related to their own research topic.

*Graduate schools*-Graduate schools could play a valuable role in helping departments, faculty, and students to articulate the transferability of skills learned across doctoral programs. Graduate schools, in collaboration with centers for learning, could help academic departments to identify the skills acquired through teaching experiences and articulate how they relate to students' research skills. A graduate school, for example, could hold a series of focus groups around this topic and generate a campus wide report. Additionally, graduate schools could encourage academic departments to have their own conversations on this topic and encourage faculty to have their students regularly reflect on how teaching has contributed to their overall development.

- Students need multiple mentors and apprenticeship relationships in order to successfully become independent researchers.

*Faculty members*-Currently graduate schools and academic departments formally require students to select an advisor and supervisory committee as part of their doctoral experience. While these individuals play an important role in students' development, students are rarely encouraged to seek out and develop apprenticeship relationships beyond their advisor and committee members. Faculty members should help create and promote the department as a community of practice in which doctoral students are expected to learn from multiple individuals through legitimate peripheral participation. By stressing the important role that the entire community (other faculty members, post-doc's, peers, etc.) has in promoting and supporting students' development, faculty may help diminish students' over-reliance on any one person to meet all of their developmental needs (see Nerad, 1995). This should not be misused by faculty as a way to absolve themselves of their advisory responsibilities, but rather as a vehicle with which to help doctoral students understand the extensive amount of resources and support

available from different members of their community. Such conversations would be particularly important early on when doctoral students are entering and adjusting to their programs.

*Doctoral students*-The most common definition of an apprenticeship relationship in doctoral education is a long-term, one-on-one interaction, between a student and his/her advisor. Although it would be ideal for all students to have access to long-term apprenticeship relationships, this is not always possible. Students should not exclusively rely on their advisor or passively wait for an apprenticeship relationship to occur. Instead, students should seek out apprenticeship moments around different types of activities from other faculty, peers, professionals, etc. Students who seek out guidance and support, are more likely to have their needs met. For example, any faculty member who has a lot of experience publishing journal articles would be well-suited to guide a student on how to publish their own work. More advanced peers may also be helpful by providing advice on how to prepare and complete specific program requirements.

*Graduate schools*-Graduate schools regularly over-emphasize the importance of advisors and committee members in both subtle and non-subtle ways. One of the things that graduate schools can do, through their literature and through campus-wide workshops and orientations, is talk about a broader definition of apprenticeship relationships in doctoral education and encourage students to seek out assistance from a variety of people. Graduate schools could also, for example, create website profiles of recent graduates where they would share the experiences which most contributed to their development and success as researchers and scholars, and describe the varying apprenticeship relationships that helped to make their success possible.

- Cognitive apprenticeship tools should be used to facilitate apprenticeship relationships.

*Faculty members-* There was substantial evidence of cognitive apprenticeship tools being used across the three academic departments in this study. All faculty members are likely to find the cognitive apprenticeship teaching tools useful for making cognitive processes transparent to students. Faculty should become familiar with these tools and think about how they might already be using some of these strategies, or how they might be able to adapt them to their field and integrate them into their teaching and advising practices. For example, one of the tools is called reflection and it involves enabling students to compare their own problem solving processes with those of an expert. Faculty could, when working with a student, ask the student to first describe how they might address a particular problem and then share their own approach. From there, the faculty member could facilitate a conversation about the differences or similarities between both approaches and come to a shared understanding.

- Recognize the value of students' external experiences.

*Faculty members-*The fact that several students in this study identified activities outside of their Ph.D. program as significant to their development as researchers, is worth noting. It serves as an important reminder to faculty that doctoral students are not empty slates (Freire, 2000) when they enter a Ph.D. program and that they bring a wealth of experiences with them (Knowles, 1968). Faculty should develop more systematic efforts to encourage students to draw on their previous and current external experiences and recognize students' development more holistically. For example, faculty could organize a presentation in which they discuss how their own external activities and experiences contribute to their research or advanced work. Students could be encouraged to reflect on their own external experiences and how they contribute to their development as researchers and scholars in the classroom or in a portfolio. Faculty could also

work to create a culture in the department in which there are open discussions about how scholarship is informed by external activities and experiences.

- Becoming an independent researcher first requires becoming an independent learner.

*Faculty members*-Faculty members can play an important role in helping students to understand that they need to become independent learners before becoming independent researchers. This does not mean that students should be left to "sink or swim." Rather, faculty members need to provide students with activities that scaffold their learning and help students move from being dependent to self-directed. What might this look like? Initially, faculty may want to work more closely with students as they learn the task or tool and then gradually encourage their students to assume more and more responsibility and to become more independent.

*Doctoral students*-All new doctoral students have had to be independent learners at some point in their previous education. However, students will need to become fully independent in their learning in order to become independent researchers and scholars. While students will receive varying degrees of support from faculty members, peers, and others, they alone are ultimately responsible for moving their research and advanced work forward. While this may be frustrating and intimidating at first, doctoral students are adult learners who must take agency over their own work and actively seek out resources and support as needed. This may require doctoral students to re-conceptualize their notions of schooling from one in which they merely receive information and are tested on it (being a consumer of knowledge) to being able to understand a body of knowledge, recognize where the gaps are, and develop original work that contributes to the larger body of knowledge (being a producer of knowledge) (Wulff & Nerad, 2006).

*Graduate schools*-One major source of information for graduate students is their graduate school. As a result, graduate schools can play a critical role in supporting doctoral students' development by demystifying the overall Ph.D. process and having very frank conversations with all students about the transition they will be expected to make in order to become independent researchers. Graduate schools could also communicate this expectation to prospective graduate students and to undergraduate students who are considering graduate school.

**8.3 Implications for future research**

This study explored how doctoral students from three disparate academic departments at one university learned how to do research and advanced work. Overall it demonstrated that students learned through apprenticeship relationships with multiple individuals as well as through independent learning. Though this study has addressed the research question and provided rich description of students' experiences in three academic departments, additional research is needed in order to continue to expand our understanding of the apprenticeship model in doctoral education.

First, this qualitative study needs to be expanded to include other academic disciplines at State University (e.g. natural sciences). Second, the study could be expanded to look at the same disciplines at other universities. By broadening the sample and comparing the findings to the revised conceptual framework, additional changes could be made to the framework to strengthen its broad applicability. Third, the doctoral candidates interviewed had very little to say about the dissertation and the impact it had on their development as researchers and scholars. This suggests that including recently minted graduates would provide a more robust understanding of how the dissertation facilitated doctoral students' learning. Fourth, because this sample only contained

doctoral candidates, these findings do not reflect the experiences of students at earlier stages of the program as well as students who might not have completed the program. For future studies it would be useful to include students at various stages of the program including students who had left their program. Fifth, although there was evidence of cognitive apprenticeship tools being used by various individuals, several questions remain. To what extent were people aware that: a) these tools exist, b) they are being expressed to varying degrees within the formal requirements and informal activities of different programs, and c) they are being utilized within apprenticeship relationships? Determining how aware people are of these tools can help us decide whether further training, refinement, or augmentation of the tools is necessary.

Finally, in subsequent studies, efforts should be made to increase the diversity of the sample with respects to under-represented populations. The sample in this study was only diverse in terms of gender with very little representation from international and under-represented ethnic minority students. Despite significant efforts by universities, philanthropic foundations, and governmental agencies to increase diversity, "...the fact remains that doctoral programs have made significantly less progress in diversifying than have business and government, or for that matter other levels of the educational system" (Woodrow Wilson National Fellowship Program, 2005, p. 7). This is especially true within the fields of science, technology, engineering, and mathematics (STEM) in which several reports have called for more efforts to attract highly qualified women and minorities (Council of Graduate Schools, 2007; National Science Foundation Science Indicator, 2000). Purposefully over-sampling under-represented doctoral students as determined by numbers across different fields would help to improve our understanding of whether or not under-represented students have different experiences around learning how to do research and advanced work.

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## Appendix A

*Faculty Interview Protocol*

1. Sign consent form
2. Purpose of this interview is to understand
    a. How do doctoral students become researchers?
    b. What skills do they need?
    c. How do they get these skills, and from where?
3. Do you have any questions before we begin?

| Main question | Probe |
|---|---|
| 1. How would you describe the nature of research in [insert discipline]? | |
| 2. Given your experience advising students, what are some of the skills students need in order to do research in [insert discipline]? | • Are these general research skills?<br>• Sequential? |
| 3. I know that there are several formal requirements of your program and I am wondering if we can go through each and talk about how you think these experiences prepare doctoral students for advanced work. | • Coursework<br>• Exams (qualifying exam, general exam, final exam)<br>• Dissertation<br>• Funding<br>• Becoming an independent researcher |
| 4. Are there other activities or experiences that aren't required, that you feel also teach doctoral students some of the skills that you mentioned earlier? | |
| 5. Who do students learn from? | |
| 6. A common metaphor used in much of the literature on doctoral education is apprenticeships relationships. To what extent, if at all, do you see doctoral students learning research skills through apprenticeship relationships with their advisor, others? | |
| 7. Any other comments? | |

## Appendix B

*Doctoral Candidate Interview Protocol*

1. Sign consent form
2. Purpose of this interview is to understand
    a. How do doctoral students become researchers?
    b. What skills do they need?
    c. How do they get these skills, and from where?
3. Do you have any questions before we begin?

| Main question | Probe |
|---|---|
| 1. What is the nature of research or advanced work in [insert discipline]? | |
| 2. What types of skills do you need to do research in [insert discipline]? | • Are these general research skills?<br>• Sequential? |
| 3. How have you learned to do research? | |
| 4. From whom have you learned the skills needed to do research? | |
| 5. What role if any did the following have in teaching you research skills? | • Coursework<br>• Exams<br>• Dissertation<br>• Funding |
| 6. Are there other activities or experiences that weren't formally organized or structured by the department that you felt you learned research skills? | |
| 7. A common metaphor used in much of the literature on doctoral education is apprenticeships relationships. To what extent, if at all, would you describe yourself learning research skills through an apprenticeship relationship with your advisor, others? | |
| 8. Any other comments? | |

**Appendix C**
***How doctoral students become researchers?***
**Consent Form**
(For Faculty members)

Researcher: Emma Flores, Doctoral Candidate, Educational Leadership and Policy Studies-Higher Education, College of Education, University of Washington **(206) 616-6364**, emxf@u.washington.edu

Faculty Advisor: Dr. Maresi Nerad, Educational Leadership and Policy Studies, College of Education, University of Washington, (206) 616-4805, mnerad@u.washington.edu

*Please note that as with all e-mail communications we cannot completely ensure the confidentiality of information sent via e-mail.*

**Researcher statement**

The purpose of this consent form is to give you the information you will need to decide whether you want to be in this study or not. Please read the form carefully. You may ask questions about the purpose of this 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 I have answered all of your questions, you can decide if you want to be in the study or not. This process is called "informed consent." Upon signing this form, I will give you a copy for your records.

**Purpose of the Study**

The purpose of this research is to gather empirical data on how doctoral students become researchers across three different academic programs. I am specifically interested in what skills doctoral students need in order to do research in your discipline/field and how your doctoral program is structured to teach students those skills. These findings will be a first step in exploring what types of activities and experiences help prepare students to do research in their discipline/field and how students' learning is facilitated. Additionally, findings from this study will help identify shifts in the pedagogy of doctoral education in the United States and inform efforts aimed at improving the research education of Ph.D.s.

**Study Procedures**

If you choose to be part of the study, I will be asking for a maximum of two hours of your time. An initial interview will last approximately one hour, and if necessary, I will request a follow-up interview which is likely to be much shorter. The questions are open-ended in nature and will focus on your experience with doctoral education in your discipline or field.

The following questions are exemplary of the types of questions that I will ask during the interviews:

- What skills do doctoral students need in order to do research in your discipline/field?
- How is your doctoral program structured?
- In what ways do these requirements teach students research skills?

With your permission, the interviews will be recorded so that I can have an accurate record of our conversation. My advisor and I will be the only ones' who will have access to the recordings, which will be kept in a password protected file on my computer. You will have the right to decline to answer any question, to stop the interviews at any time, and to stop the audio taping. The interviews will be transcribed within five weeks. I will destroy the audio files on or before June, 2014. Please indicate below whether you would agree to have your interviews recorded. There may be reason to revisit the recordings for future research, but I will seek your consent should this be the case.

A study code will be assigned to your transcript to protect your confidentiality. In this study, you will be identified only by a pseudonym and any other identifiable references will be deleted. In addition, there is the possibility that I will need to contact you for clarification purposes and I seek your consent to be able to contact you after the interviews for this purpose.

**Risks, Stress and Discomfort**

As with any recorded interview, there is a chance that you may feel self-conscious. As noted above, you have the right to stop the interviews at any time, or request that I cease recording at any point. It is also possible that you may feel that being asked questions is an invasion of privacy. You may request a transcript of the interviews, and request that portions that make you uncomfortable, be deleted. Another possible source of discomfort may be my taking notes during the interviews. You may request a copy of my summarized notes and also request that any portions of these notes, which make you uncomfortable, be deleted.

**Benefits of the Study**

This study seeks to gather empirical data on how doctoral students are prepared as researchers across three academic programs. One possible outcome of this study is that it might help other academics to think about the fundamental purpose of their doctoral program and how their program is designed to prepare future researchers. Another possible outcome of this study is that it might identify best practices, which may be useful for other doctoral programs in your discipline and beyond. Although I hope the findings of this study will benefit your academic program, you may not directly benefit from taking part in the study.

**Other Information**

Participation in this study is completely voluntary. You may refuse to participate and withdraw from this study at any time. Choosing to take part in this study, to not take part in this study, or to withdraw from the study will not affect benefits to which you are otherwise entitled.

Every effort to maintain confidentiality will be attempted, but complete confidentiality cannot be guaranteed. Identifying information will be kept in a separate secure location from the actual data and only I and my advisor will have access to this information. The data will be coded and pseudonyms will be used to ensure confidentiality in all written reports. Information that clearly identifies subjects will be altered or deleted from all written reports.

The data collected will be used for my dissertation research. The findings of this study may also be used in future conference presentations, publications, and evaluations. In the event that any data will be shared, your name will not be used.

Government or university staff sometimes reviews 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.

If you have any questions about this research study, please contact Emma Flores at the telephone number or e-mail listed above. If you have any questions about your rights as a subject, call the Human Subjects Division at the University of Washington at (206) 543-0098

**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 the researcher who is listed above.

I give permission for the interviews to be digitally recorded.
☐ Yes ☐ No

I give permission for the researcher to re-contact me to clarify any information gathered during our interviews.
☐ Yes ☐ No

| Printed name of subject | Signature | Date |
|---|---|---|

**Appendix D**
***How doctoral students become researchers?***
**Consent Form**
(For Doctoral Candidates)

Researcher: Emma Flores, Doctoral Candidate, Educational Leadership and Policy Studies-Higher Education, College of Education, University of Washington **(206) 616-6364**, emxf@u.washington.edu

Faculty Advisor: Dr. Maresi Nerad, Educational Leadership and Policy Studies, College of Education, University of Washington, (206) 616-4805, mnerad@u.washington.edu

*Please note that as with all e-mail communications we cannot completely ensure the confidentiality of information sent via e-mail.*

**Researcher statement**

The purpose of this consent form is to give you the information you will need to decide whether you want to be in this study or not. Please read the form carefully. You may ask questions about the purpose of this 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 I have answered all of your questions, you can decide if you want to be in the study or not. This process is called "informed consent." Upon signing this form, I will give you a copy for your records.

**Purpose of the Study**

The purpose of this research is to gather empirical data on how doctoral students become researchers across three different academic programs. I am specifically interested in what skills you need in order to do research in your discipline/field, and where and how you have learned these skills. These findings will be a first step in exploring what types of activities and experiences help prepare doctoral students to do research in their discipline/field and how this learning is facilitated. Additionally, findings from this study will help identify shifts in the pedagogy of doctoral education in the United States and inform efforts aimed at improving the research education of Ph.D.s.

**Study Procedures**

If you choose to be part of the study, I will be asking for a maximum of two hours of your time. An initial interview will last approximately one hour, and if necessary, I will request a follow-up interview which is likely to be much shorter. The questions are open-ended in nature and will focus on your experience in your doctoral program in relation to becoming a researcher.

The following questions are exemplary of the types of questions that I will ask during the interviews:

- What skills do you think doctoral students need in order to do research in your discipline/field?
- How is your doctoral program structured?
- In what ways do you feel these requirements have taught you research skills?

With your permission, the interviews will be recorded so that I can have an accurate record of our conversation. My advisor and I will be the only ones' who will have access to the recordings, which will be kept in a password protected file on my computer. You will have the right to decline to answer any question, to stop the interviews at any time, and to stop the audio taping. The interviews will be transcribed within five weeks. I will destroy the audio files on or before June, 2014. Please indicate below whether you would agree to have your interviews recorded. There may be reason to revisit the recordings for future research, but I will seek your consent should this be the case.

A study code will be assigned to your transcript to protect your confidentiality. In this study, you will be identified only by a pseudonym and any other identifiable references will be deleted. In addition, there is the possibility that I will need to contact you for clarification purposes and I seek your consent to be able to contact you after the interviews for this purpose.

**Risks, Stress and Discomfort**

As with any recorded interview, there is a chance that you may feel self-conscious. As noted above, you have the right to stop the interviews at any time, or request that I cease recording at any point. It is also possible that you may feel that being asked questions is an invasion of privacy. You may request a transcript of the interviews, and request that portions that make you uncomfortable, be deleted. Another possible source of discomfort may be my taking notes during the interviews. You may request a copy of my summarized notes and also request that any portions of these notes, which make you uncomfortable, be deleted.

**Benefits of the Study**

This study seeks to gather empirical data on how doctoral students are prepared as researchers across three academic programs. One possible outcome of this study is that it might help other academics to think about the fundamental purpose of their doctoral program and how their program is designed to prepare future researchers. Another possible outcome of this study is that it might identify best practices, which may be useful for other doctoral programs in your discipline and beyond. Although I hope the findings of this study will benefit your academic program, you may not directly benefit from taking part in the study.

**Other Information**

Participation in this study is completely voluntary. You may refuse to participate and withdraw from this study at any time. Choosing to take part in this study, to not take part in this study, or to withdraw from the study will not affect benefits to which you are otherwise entitled.

Every effort to maintain confidentiality will be attempted, but complete confidentiality cannot be guaranteed. Identifying information will be kept in a separate secure location from the actual data and only I and my advisor will have access to this information. The data will be coded and pseudonyms will be used to ensure confidentiality in all written reports. Information that clearly identifies subjects will be altered or deleted from all written reports.

The data collected will be used for my dissertation research. The findings of this study may also be used in future conference presentations, publications, and evaluations. In the event that any data will be shared, your name will not be used.

Government or university staff sometimes reviews 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.

If you have any questions about this research study, please contact Emma Flores at the telephone number or e-mail listed above. If you have any questions about your rights as a subject, call the Human Subjects Division at the University of Washington at (206) 543-0098

**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 the researcher who is listed above.

I give permission for the interviews to be digitally recorded.
☐ Yes ☐ No

I give permission for the researcher to re-contact me to clarify any information gathered during our interviews.
☐ Yes ☐ No

| Printed name of subject | Signature | Date |
|---|---|---|

## Appendix E

Table A1

*Post-Interview Demographic Questionnaire*

| Question | Follow-up question |
|---|---|
| In what year were you born? | |
| What was your undergraduate major and where did you receive your degree? | |
| What year did you complete your undergraduate degree? | |
| Do you have a master's degree? | What did you get your master's in, and where did you get it? |
| Did you work prior to beginning the Ph.D. program? | |
| What year did you enter the WU Ph.D. program? | |
| What were your career goals at the time you entered the Ph.D. program? | |
| What do you plan to do after you graduate? Please be specific about the type of position you hope to get and what sector you would like to work in. | |
| Any additional comments? | |

## APPENDIX F

Table A2

*Graduate Student Enrollment across Sample Departments*[22]

| | **Bioengineering** | | | **Comparative Literature** | | | **Sociology** | | |
|---|---|---|---|---|---|---|---|---|---|
| | Full-time | Part-time | Total | Full-time | Part-time | Total | Full-time | Part-time | Total |
| Autumn 2010 | 104 | 21 | 125 | 38 | - | 38 | 81 | 8 | 89 |
| Autumn 2009 | 86 | 22 | 108 | 39 | 3 | 42 | 80 | 8 | 88 |
| Autumn 2008 | 90 | 28 | 118 | 41 | 1 | 42 | 79 | 8 | 87 |
| Autumn 2007 | 97 | 22 | 119 | 41 | 1 | 42 | 79 | 8 | 87 |
| Autumn 2006 | 99 | 30 | 129 | 41 | 3 | 44 | 73 | 6 | 79 |
| Autumn 2005 | 102 | 2 | 104 | 43 | 4 | 47 | 77 | 9 | 86 |

[22] Obtained online from State University Graduate School Statistics.

## APPENDIX G

Table A3

*Master's and Ph.D.s Awarded*[23]

| | **Bioengineering** | | **Comparative Literature** | | **Sociology** | |
|---|---|---|---|---|---|---|
| | Master's | Doctoral | Master's | Doctoral | Master's | Doctoral |
| 2009-2010 | 19 | 16 | 3 | 4 | 9 | 7 |
| 2008-2009 | 11 | 11 | 1 | 4 | 15 | 5 |
| 2007-2008 | 14 | 17 | 6 | 8 | 12 | 6 |
| 2006-2007 | 21 | 20 | 2 | 1 | 15 | 4 |
| 2005-2006 | 19 | 17 | 7 | 0 | 17 | 12 |
| 2004-2005 | 15 | 11 | 10 | 5 | 8 | 7 |

[23] Obtained online from State University Graduate School Statistics.

# APPENDIX H

Table A4

*Codes Used in Analysis of Data*

| Analyst-constructed categories | Categories generated by participants |
|---|---|
| Advisor | Attrition |
| Apprenticeship | Being a good researcher |
| Committee | Big push to focus on your research |
| Courses | Cluster of interest |
| Dissertation | Co-authorship |
| Formal requirements | Cohort |
| Funding | Collaboration |
| General exam | Community |
| Graduate student advisor | Cultural differences |
| How you identify as a scholar | Diversity of Bioengineering Department |
| How you learned to do research | Expectations about program |
| Independent researcher | Grad vs. undergrad experience |
| Informal activities | Ideal student |
| Informal learning environments | Interdisciplinarity |
| Master's thesis | Job market |
| Mentoring | Lab rotation/switching |
| Nature of research in field | Laboratory |
| Professors | Language requirement |
| Prospectus | Ph.D. admission |

| | |
|---|---|
| Qualifying exam | Post-doc |
| Research methods | Publishing |
| Research project | Purpose of Ph.D. |
| Role of peers | Reputation of program |
| Skills needed to do research in field | Research funding |
| Social activities | Research tools |
| Structure of program | Student driven projects |
| Teaching | Success in Department |
| Who do students learn from | Time to degree |
| Who did you learn from | To be successful in graduate school |