

Ready for What?:
**A Longitudinal Investigation of Eleven “College-Ready” Students’
Disciplinary Literacy Learning Experiences from High School into College**

by

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DEDICATION

This dissertation is dedicated to the eleven students who shared their stories, their vulnerabilities, their feelings, and their insights with me. Without them and their willingness to share with me, this work quite literally would not be possible. Thank you for trusting me to share your stories. I am so grateful to have learned from and with you. I know you will influence the world in such positive and powerful ways. I am so lucky to know each of you.

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ABSTRACT

Resounding calls for reform in K-12 education in the service of “college readiness” have become all but ubiquitous. The K-12 standards-based and literacy reform efforts have urged for teaching and learning that advances the practices and inquiry approaches within and across disciplines—called *disciplinary literacy learning*— which seeks to replace generic approaches to reading and writing instruction that lacks attention to domain-specific practices and skills. Despite these reform efforts and advancements in K-12 teaching and learning, little is known of what students will encounter academically once they enroll in colleges and universities. This begs the question “*ready for what?*”— what academic and literacy learning experiences do students encounter once in college and how do students navigate these experiences?

This study investigates the experiences of eleven “college-ready” students from their junior years of high school through their first two years of college. I investigated the nature of the teaching and learning from their high school years, which resulted in these students meeting every commonly used metric of college readiness. Then, I followed the students to seven different institutions of higher education to document their learning experiences and how they navigated these demands.

Data sources included 76 hours of audio recorded interviews along with numerous (over 1,400) academic artifacts, syllabi, exams, assessments, presentations, and “daily diaries” to analyze the nature of the academic learning experiences in high school and college. I used constant comparative analysis to identify the patterns among students, their courses, and across time.

In high school, I found that these eleven students experienced disciplinary literacy learning and inquiry regularly within and across courses. This involved the use of disciplinary texts, the use of problem frames, inquiry cycles, and engagement in the practices of the disciplines. Students were encouraged to pursue topics of interest and were positioned as novice apprentices learning alongside their teachers and classmates in “communities of practice.”

In contrast to the disciplinary literacy learning and apprenticeship-style of teaching that occurred in high school, once in college, these eleven students experienced a preponderance of *telling* and *testing* across domains and courses. Students' main academic activities involved taking exams following lecture-style teaching. Especially within the natural sciences and social sciences, students reported that spaces and courses that may have been considered collaborative or for disciplinary practices (discussion sections; lab-based courses) also became additional spaces for lecture-style teaching and exams.

When students did encounter rare opportunities for disciplinary literacy learning in college, students expressed feelings of confusion and difficulty. I found that this confusion often stemmed from a lack of scaffolding and support for students. However, these students leveraged their backgrounds and skills to navigate these confusing experiences by seeking additional information from professors and teaching assistants.

Together, the findings of this study suggest that K-12 education reform efforts are encouraging students to develop particular dispositions and skills within and across domains. In contrast, college teaching and learning seems to be dominated (at least in the first two years of college) by a pedagogy of *telling and testing*. This study serves as a warning that even "college-ready" students encountered regular confusion, difficulties, and even boredom during college. This study holds implications for the use of a disciplinary literacy learning framework in college in order to improve access, support, and relevance for *all learners*.

CHAPTER I

Introduction

One of the most critical issues facing our nation today is—what the U.S. Department of Education calls— “college and career readiness” for our graduating high school students; policymakers and researchers have made this a top priority for improving education. Concomitantly, more secondary students report a desire to attend college than ever before; several surveys indicate that close to 90% of high school students want to attend a post-secondary institution (Higher Education Research Institute [HERI], 2015a; Lauff & Ingels, 2013). Enrollment in postsecondary institutions is also up from decades past. The Educational Longitudinal Survey that began in 2002 followed students from 10th grade through age 25 (survey completed in 2012) and found that the highest levels of education completed included: bachelor’s degree or higher (33 percent); associate’s degree (9 percent); undergraduate certificate (10 percent); postsecondary attendance but no credential (32 percent); high school diploma/GED (13 percent); and less than high school completion (3 percent) (Lauff & Ingels, 2013). This snapshot provides important information about the state of higher education. More students are enrolling in programs, but the percentages of students earning credentials and degrees have not significantly increased in more than 30 years (Kazis, 2006). Said another way, about half of all community college students and one-quarter of students in four-year institutions drop out or leave college by the start of the second year of post-secondary schooling (Kazis, 2006).

College readiness is most often defined as the preparation students need to enroll and succeed in college without the need for remediation (Conley, 2007) and with success defined as being able to gain proficiency and understanding in the course topics and proceed in the next course within a sequence (Conley, 2007). Scholars have argued for a more expansive definition of college readiness reflecting the content knowledge, interpersonal skills, academic behaviors, and contextual and social awareness necessary for success in college (e.g., Conley, 2007; Karp & Bork, 2014). Predictive metrics of “college readiness” are often used as benchmarks for indicating if students are ready or deemed not ready for college. Although these are not certain measures for readiness, the metrics indicate that very few students are “ready” for college. For example, in 2015, 59% of high school graduates took the ACT exam, and of those, only 28% of students met all four college readiness benchmarks in mathematics, science, English, and reading (ACT, 2015). Mathematics and science were among the lowest scores with the lowest percentages of students attaining benchmark standards. Noticeably, these statistics indicate that only a small percentage of our nation’s students are considered well prepared for college and even smaller percentage are attaining a degree once in college.

As a response to these realities, the standards-based reform movement in the US is focused on increasing college readiness and academic preparedness for students to enter post-secondary institutions and future careers. The *Common Core State Standards* (CCSS) even call the overarching benchmarks “College and Career Readiness Anchor Standards for Reading and Math.” The CCSS standards in English Language Arts urge the use of complex texts for reading, writing, thinking, speaking, and listening. Especially true of secondary school standards in CCSS, the standards are urging for students to engage with texts using

complex reasoning, argumentation, critique, and development of literacy skills (Council of Chief State School Officers [CCSSO], 2010). CCSS for mathematics emphasizes the use of mathematical practices as the approach to problem-solving; CCSS math practices ask students to, for example, model with mathematics, construct viable arguments about math and critique the reasoning of others, and find and make use of mathematical expression structures for understanding and interpreting problems (CCSSO, 2010).

Within the domain of social studies, learning standards called the *College, Career, and Civic Life ('C3') Framework* have recently been adopted by 27 states (National Council for Social Studies [NCSS], 2013). These learning standards position students as capable, with developmentally appropriate supports, of constructing and investigating problems, gathering sources, evaluating, and taking action. In science teaching and learning, the *Next Generation Science Standards (NGSS)*, developed out of the National Research Council's *Framework for K-12 Science Education*, describe "three-dimensional learning" focused on developing an understanding of science, engineering, and technology core ideas and crosscutting concepts using disciplinary practices of science domains. At the core of these learning standards is an emphasis on inquiry and disciplinary literacy practices across domains of science and across grade levels (NGSS Lead States, 2013).

States are adopting these standards which call for a more specialized and disciplinary form of teaching and learning, one that highlights the domain-specific practices across disciplines. Called *disciplinary literacy learning* and *disciplinary literacy instruction*, this kind of learning and teaching marks a shift in expectations for what students should learn and be able to do. However, there is much data suggesting that this advanced literacy learning is not yet happening in secondary classrooms (Carnegie Council on Advancing

Adolescent Literacy [Carnegie Council], 2010). Increased participation, preparation, and experiences with more domain-specific language and literacy skills during K-12 schooling seem promising for college success. To fully consider the benefits of these K-12 reforms, we must ask about the learning happening in higher education: What is the nature of academic work in college? What do we know about the disciplinary literacy demands of college? What are the expectations, supports, and difficulties students may encounter as a part of college?

This dissertation study was motivated by these issues and sought to grapple with the reform efforts permeating K-12 teaching environments and, still recognizing the gross inequities in school learning outcomes for the students who are able to make it there, the realities that students face upon entering college. Also, given the ubiquitous nature of the phrase “college and career readiness,” I sought to provide a nuanced perspective and analysis of what this term might mean given the current climate and realities of education. In this study, I followed a group of eleven young people from their junior year in high school, in the same highly regarded college preparatory high school, through their first two years of college, as they attended seven different higher education institutions. These students were considered “college ready” by all available metrics. They exceeded benchmarks in standardized and college admission testing, were admitted to multiple colleges and universities, took multiple advanced placement (AP) courses, engaged in rigorous reading and writing across high school courses, and were not remediated in any first-year college coursework (ACT, 2015; Conley, 2007), and were, in fact, “placed out” of and received college credit for several first-year course requirements.

Despite the students' seeming "readiness," almost every student participating in my research wrote independently to me seeking advice during their first few months of college; I received multiple emails with stories of successes, but also with stories of confusion, lack of clarity and purposes for tasks, difficulties, and experiences of "gatekeeping," or barriers to entry in a field or course. As I read these messages, I began to wonder: What is meant by college readiness when such well-prepared students were struggling and confused? If these students were struggling, then what must the experience be for those students who were not so well prepared? Should the call for college readiness be interpreted as being able to engage in all of what is demanded in college independently? What is the role of colleges and universities to continue to develop the skills that young people bring to their college experiences?

The stories from these "college ready" students prompted me to study their experiences in college, in addition to their experiences that I had studied when they were in high school. The goal was to capture the students' successful navigation and engagement and also to provide a nuanced image of the difficulties that even the most prepared students are encountering in college. To date the notions and definitions of college readiness remains a largely unidirectional construct; it signals that K-12 education prepares students to be "ready" for college, and then students should be prepared to independently and successfully navigate the demands of college once there. This study considers and questions these assumptions by asking, how were these "college ready" students prepared in a disciplinary literacy focused secondary school context? With these disciplinary literacy skills and backgrounds, what did students encounter once in college? How did these students navigate the complexities of college academic experiences? What

are or what should be the realities of college learning during a time with so many students have goals of matriculating to college campuses?

Study Overview: Research Questions and Overarching Research Design

Through this dissertation study, I sought to contribute a complex and nuanced perspective of what “college readiness” means, the academic realities of college, and the ways academic and literacy reform efforts have changed (or, in some cases, not changed) the academic realities of K-12 and college learning and teaching.

The research questions guiding my study are:

1. How were the eleven “college-ready” students prepared for their college experiences during high school, in a context that used disciplinary literacy teaching and learning approaches within and across domains (as called for by many K-12 standards-based reform documents)?
2. What were the academic tasks and texts (i.e., the features, requirements, demands) these students encountered during the first two years of college?
 - a. What were the difficulties and challenges posed by the academic tasks in college?
 - b. To what extent did these tasks depend on disciplinary literacy skills?
 - c. How did the structures of college learning promote or restrict disciplinary practices and interactions?
3. How did students navigate the various academic challenges, language-based learning experiences, and difficulties they encountered in college?

To investigate these research questions, I engaged in a longitudinal investigation of these eleven students' experiences over a four-year period, from the students' junior year of high school through their sophomore year of college. In the initial phase of the study, I collected contextual data about the students' disciplinary literacy experiences in high school by documenting the inquiry activities, texts, tasks, and experiences that shaped students' disciplinary practices and disciplinary literacy skills. By the end of high school, these eleven students met every metric of college readiness commonly used in literature. Sparked by their stories of confusions, struggles, and difficulties in college, I spent two years following the students as they engaged in their course work in college. I interviewed students during semester breaks in college, gathered disciplinary and course artifacts, and used daily diaries to document students' experiences in real time. In total, I collected approximately 76 hours of interviews across high school and college. I collected most major assessments, assignments, and all course syllabi (over 1,400 artifacts) related to the 182 courses students took in their first two years of college. Throughout the data analysis, I used Constant Comparative Analysis (CCA) (Glaser & Strauss, 1967) in recursive and iterative rounds of coding and analysis to identify themes and patterns among these various data sources. I created a key linkage chart to illustrate the connections of the central constructs under investigation in this study. The key linkage chart is located at the start of Chapter IV called Figure 4.1, which describes the major findings and the relationships among these findings.

Key Constructs

These research questions, analysis, and study design depend on complex constructs. Because these constructs can have varied definitions, I briefly define these terms and discuss the analytic implications for this study. Figure 1 provides an adapted image of the literacy model put forth by the RAND Reading Study Group (2002) that describes the specialized nature of disciplinary literacy and the use of these literacy practices in learning environments. The model describes several of the key constructs defined here and illustrates the relationships among them.

Literacy

By *literacy*, I mean practices and enactment of text use for a given purpose within a sociocultural context (Scribner & Cole, 1981). I based this conception of literacy on the widely used model, the RAND Model, that describes the complex interactions that learners face as they engage in reading, writing, thinking, speaking and other literate activities. In the landmark literacy report, *Reading for Understanding*, the authors emphasized that literacy demands for readers shift based on text(s), activities or purpose(s), and the learner/reader in terms of background skills, knowledge and experiences (RAND Reading Study Group, 2002). This interaction is surrounded by a social and cultural context; these contexts may include the environment of text use, the history of the reader, the disciplinary domain, and the support, access, and experience that affects the text and task enactment.

Disciplines, Disciplinary Literacy, and Disciplinary Literacy Learning

For my purposes, I define *disciplines* as organized domains with reasonably structured topics, modes, and methods of inquiry with shared practices for constructing and producing meaning. By *disciplinary literacy*, I refer to those specialized practices of literacy and inquiry that drive the knowledge construction and production within domains.

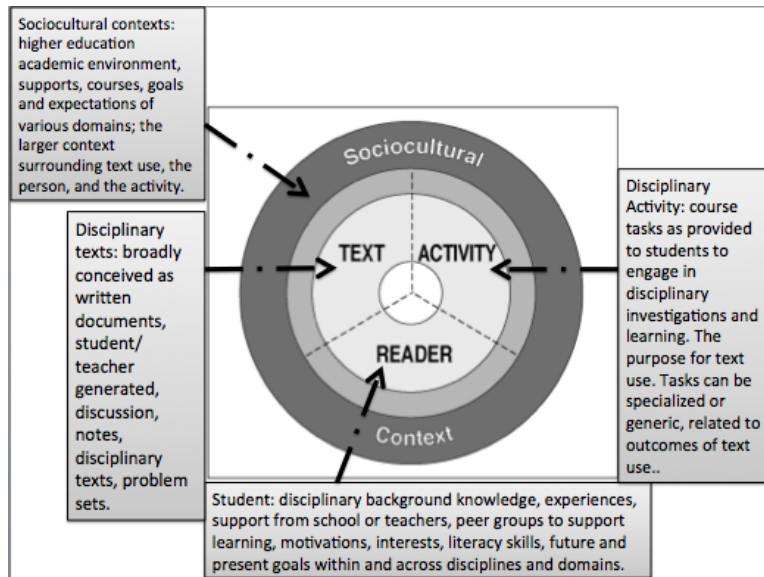
As many scholars and theorists have posited (Hirst, 1972; Moje, 2008; Shanahan & Shanahan, 2008), academic disciplines, like other discourse communities (Gee, 1990) and cultures, possess specialized literacy practices, particular ways with words (Heath, 1983), and problems that drive cycles of inquiry (Moje, 2015). Therefore, for students and learners to be positioned to engage meaningfully in disciplinary learning and to grow their practices over time, and not just learn *about* a domain but instead pursue, construct, and inquire *within* domains, texts and tasks must be designed inside of learning environments to support this development. Well-articulated questions of inquiry (tasks) and use of disciplinary texts (those that support investigation into these disciplinary problems), allow students access to and development of these specialized practices.

Disciplinary Literacy Texts and Tasks

In this study, *disciplinary texts* are broadly conceived and include written documents, maps, problem sets, guides, textbooks, novels, lab manuals, as well as student and class generated texts such as discussions, organizational tools, and other course guides (Moje, Stockdill, Kim, & Kim 2011). As Wade and Moje (2000) explain, “texts...are organized networks that people generate or use to make meaning either for themselves or for others. Texts can be formalized and permanent...or informal and fleeting” (p. 610). As these theorists describe, texts should be thought of as tools to be used for a given task of activity. The *disciplinary task or activities* drive the use of disciplinary texts to engage in domain-specific problems. Most important is the central nature of inquiry itself, which drives the use of texts and disciplinary practices toward knowledge construction and production. As sociocultural theorists posit (Vygotsky, 1962; 1978), increased use of disciplinary practices promote further development of skills, increased agency, navigation, and access within and

across domains.

Figure 1.1: Model of Disciplinary Literacy Learning, Adapted from RAND Model of Literacy



This dissertation study investigated the use of this disciplinary literacy model within one secondary school context as well as across different contexts and institutions of higher education to understand how the use of texts in the service of activities and tasks by the students in this study. I used this model to interpret and understand these eleven young people's high school learning experiences and how they navigated and made sense of their learning experiences on in college.

Overview of the Dissertation

In Chapter Two, I provide a review of theoretical and empirical studies that describe disciplinary literacy, the research in K-12 contexts about disciplinary literacy learning, and the landscape of student learning and instruction in higher education.

In Chapter Three, I describe the research design and methodologies of this study. I describe my contextual and focal data, the use of interviews, artifacts, daily diaries, and questionnaires as a part of data collection and present approaches to data analysis.

In Chapters Four, Five, and Six, I present the findings from this study. In Chapter Four, I describe the high school context of these eleven college-ready students, who regularly engaged in disciplinary literacy learning and inquiry practices. In Chapter Five, I present the findings of these eleven students' college experiences over their first two years of college. This chapter includes findings about the shared patterns of learning experiences among all eleven students across higher education institutions. Then, I present two case studies focused on disciplinary learning experiences of natural science and social science majors within their major area course work. In Chapter Six, I present findings about students' skills of navigation and sense of agency as they interpreted, engaged in, and deciphered the expectations of college. I found that when disciplinary and language-based work confused them, students sought answers, and when college lacked rich disciplinary experiences, students constructed or refined these experiences to gain more skills and opportunities in these domains.

In Chapter Seven, I describe the conclusions and implications of this dissertation study. I outline the general conclusions from this study. Then, I review the ways the findings may contribute to future directions of K-12 and higher education research and approaches to disciplinary literacy learning and teaching.

CHAPTER II

Theoretical and Empirical Perspectives

For this study of how eleven “college-ready” students were prepared for college and what academic and literacy-based experiences they had once in college, I draw on theoretical and empirical research from various fields to understand their disciplinary literacy learning and instruction, including: (a) the literature and policy calls for domain- and discipline-specific approaches to K-12 teaching and learning, and, (b) the literature focused on the landscape of higher education regarding learning experiences of students. To be sure, this breadth of literature possesses various perspectives; however, when described together, the calls for reform efforts to better prepare K-12 students for college coupled with the realities of college classrooms poses questions about and considerations for the directions of K-12 *and* higher education learning structures and expectations.

In this chapter, I review the current state of K-12 education and the reform efforts being called for as a part of “college and career readiness,” specifically as they relate to literacy learning. I argue that the standards-based reforms are calling for an approach to education that foregrounds the practices within the disciplines—called *disciplinary literacy learning*—and seeks to support students’ flexible navigation within and among these specialized practices to prepare them for future participation in these domains and various other domains of their lives. I also argue that this kind of teaching rarely happens, and more research must be conducted to understand how these reforms are adopted in classrooms with an eye toward college readiness and access. Then, I review what is known

about the landscape of higher education and the calls for teaching and learning reforms. I argue that higher education lacks cohesive understandings of what happens within college classrooms (and, in fact, there are calls for the transformation and transparency of college teaching and learning). I argue that nuanced and specific studies of students' experiences in college must be conducted to understand the realities and perspectives of learners on college campuses.

Calls for Reform in K-12 Education

The landscape and expectations of education are changing rapidly. Past notions of schooling and learning as the passive transmission models of education (National Research Council [NRC], 2000) are not meaningful or useful given the complex, dynamic realities of our society. Instead, successful schooling at all levels should prepare young people to engage in deep meaning-making, problem-solving, inquiry, critical thinking, disciplinary engagement, and productive and creative use of the enormous amount of resources, texts, and information available literally at one's fingertips (e.g., *CCSS, NGSS, & C3 Framework*; NRC, 2005). Similarly, literacy scholarship has shifted notions away from a static definition of literacy as the ability to read and write, and toward an understanding of literacy as a complex set of tools, practices, and skills that one learns to appropriately enact for given purposes (e.g., Scribner & Cole, 1981). Literacy skills and "literacies" are enacted based on social and cultural context, the nature and demands of texts, and the intended purposes and use of texts (e.g., Gee, 1990; Moje, 2007; RAND Reading Group, 2002; Scribner & Cole, 1981). Multi-faceted, multi-dimensional, dynamic, purpose-driven, and socially- and culturally-mediated describe the complex nature of literacy, language, and the development of these practices (Scribner & Cole, 1981).

K-12 education has undergone decades of standards-based reform efforts, which have resulted in shared educational standards promoted and adopted across states. These standards have begun to permeate schools and classrooms. The movement toward these common standards in disciplinary subjects marked an unprecedented opportunity to advance and engage in more shared, specialized, disciplinary teaching and learning that focused on practices, skills, and dispositions that would best prepare students for opportunities in higher education and diverse careers. The intention of these standards is to advance skills and literacies within and across domains.

The most broadly adopted standards-based initiatives in K-12 include *Common Core State Standards for English Language Arts and for Mathematics* (CCSSO, 2010), *the Next Generation Science Standards: For States, By States* (NGSS Lead States, 2013), and the *College, Career, and Civil Life (C3) Framework for Social Studies State Standards* (NCSS, 2013). Within these standards, framers have developed student learning targets across K-12 classrooms, without designing prescriptive curricula to enforce how to attain and advance these learning goals. These standards allowed for unprecedented focus on domain-specific learning standards that also integrated literacy skills and disciplinary practices as a part of the learning targets. For example, within the *CCSS* English learning goals, the overarching “anchor standards” designed to promote readiness include developing:

- abilities to read a variety of genres and complex texts in order to analyze key ideas and details, to interpret texts, and to integrate and evaluate text based on reasoning and evidence;
- writing for various purposes and various text types, producing and distributing coherent, structured, and developed writing, and research to build and present knowledge;

- skills in presenting knowledge and ideas through speaking and listening which takes the form of comprehension of conversations, discussions, evaluating information in various forms, and abilities to collaborate with others to build ideas; and,
- diverse vocabulary, knowledge of language and function, and conventions across domains.

The *CCSS English Language Arts* learning goals also emphasize the importance of text complexity. The standards explain that text complexity refers to the interplay of “qualitative evaluation of text,” the “quantitative evaluation of text,” and “matching reader to text and task” (*CCSS*, Standard 10: Range, Quality, and Complexity). This indicates that texts used to teach and advance learning goals should include complex levels of meaning and structures, should consider knowledge demands on readers (qualitative), appropriate levels of readability and other scores of complexity (quantitative), and the task, questions, purpose and other aspects that readers’ bring to the text. The goals of these standards are to advance students’ skills and engagement with a variety of texts and to develop skills of argumentation, analysis, use of evidence, speaking and listening skills, and critical use of text for analysis, synthesis, critical thinking, and literary purposes.

In mathematics K-12 education, the learning goals outlined by *CCSS* describe overarching mathematical practices that should be advanced by the problem-solving and engagement in mathematics. The eight mathematical practices include:

1. make sense of problems and persevere in solving them
2. reason abstractly and quantitatively
3. construct viable arguments and critique the reasoning of others
4. model with mathematics
5. use appropriate tools strategically
6. attend to precision
7. Look for and make use of structure
8. Look for an express regularity in repeated reasoning

As the CCSS mathematics standards document explains, “the Standards for Mathematical Practices describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise” (CCSS, “Mathematical Practices”). The goal of these standards is to foster a deeper conceptual understanding of mathematics using literacy skills that are practices relevant and used within the discipline of mathematics. The mathematical standards urge teachers to incorporate reading, writing, thinking, speaking, and critical thinking into mathematics so that students can engage in opportunities to develop these skills in particular ways within the study and engagement of mathematical reasoning and problem solving.

The NGSS standards, developed using the National Research Council Framework for K-12 Science Education (2012), has advanced the “three-dimensional model of science learning” that promotes engagement in (a) disciplinary core ideas, (b) science and engineering practices, and (c) crosscutting concepts. The structure of the standards alone indicated the emphasis on inquiry and use of specialized skills in science. For example, within science and engineering practices students should engage in:

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating and communicating information.

Again, these learning targets at grade bands describe ways students can, in age appropriate ways, engage in these scientific practices, for use in understanding and engaging in core ideas and crosscutting concepts. These standards advance scientific literacy and use of

scientific process to learn the disciplinary core ideas of science. In this way, students are not passive recipients of this scientific knowledge, but instead are asked to be actively engaged in the construction of scientific knowledge and inquiry (NRC, 2005). The standards ask for an approach to teaching and learning that foregrounds the practices within the domains of science.

The *C3 framework* describes the “inquiry arc” that guides these standards for learning in history, geography, civics, and economics. The dimensions of this inquiry should include aspects of (a) developing questions and planning inquiries; (b) applying disciplinary tools and concepts; (c) evaluating sources and using evidence; and, (d) communicating conclusions and taking informed action. The goals of these standards are to engage young people in meaningful construction of problems and investigation of sources to seek insights as a way of developing critical thinking skills, disciplinary skills of investigation, and flexible literacies for across students’ future civic lives (NCSS, 2013).

The intention of the aforementioned standards in K-12 education is to prepare all students for college and careers. As was described previously, scholars have defined “college and career readiness” as the preparation necessary for students to engage in entry level college coursework and successfully complete the course with proficiency which allows them to enroll in the next course in the sequence. Recognizing that this limited definition of readiness does not capture the details and behaviors necessary for this preparation and successful transition, some scholars have developed broader definitions of college readiness (e.g., Conley, 2007; Karp & Bork, 2014). In his expanded definition, Conley (2007) describes content knowledge, academic behaviors, and contextual skills and awareness as necessary attributes and skills for success in college. For example, Conley

(2007) cites the need for students to develop “mastery of key concepts and ways of thinking in one or more scientific disciplines” and “understand the values and norms of college and disciplinary subjects that serve as organizing structures of intellectual communities” (p. 18). The expanded standards describe the necessity for specialized disciplinary knowledge, abilities for independent work, skills of seeking assistance from professors when needed, and other social awareness required for success in college. Although the broader definitions of readiness capture a necessary breadth of skills, it is difficult to know the preparation involved and the relative importance of each skill for college learning. In other words, students are asked to be socially, emotionally, financially, and academically “ready” for college. For educators, it is difficult to know how to support students when the breadth of expectations in college is large and lack specificity on what students experience and need once in college. It also, in many ways, ignores the ways that college must be prepared and *ready for* the students they seek to serve.

For my purposes in this dissertation, I define college readiness as the ability and support necessary for students to pursue, construct, and question knowledge in a field or academic major of their choosing as they are supported by educators and professors to pursue these goals and skill development. However, as this dissertation illustrates, college readiness is not unidirectional nor a phenomenon only possessed by students, fully realized, upon entering college. I argue that we should think of college readiness as a bifurcated phenomenon and construct. Colleges should also be *ready* to support students to engage them in and make visible the practices of the disciplines within which students are learning and constructing knowledge. This dissertation illustrates the ways that college readiness, as I have defined it, has not been fully realized as in college students are not

often positioned to engage in disciplinary practices regularly or in ways that provide development, inclusion, and a sense of agency by students.

A Brief History of Literacy Research and Theory

Evident in these standards documents and our current K-12 education climate is a call for and requirement of learning and teaching based on disciplinary practices and disciplinary literacy skills, as opposed to the rote, memorized list of “knowledge” that once dominated education models. The field has interpreted “college and career readiness” to mean flexible literacy skills, developed specialties and skills within and across domains. To support these flexible literacies, practices, and skills within and across domains, the expectations about teaching and learning (including the tasks, texts, activities) inside of classrooms.

The current context that has advanced more domain-specific education standards around student learning has been shaped by the shifts that have occurred within the field of education research broadly, and literacy research, more specifically. These synergistic shifts reinforce what the field of education theory has learned over the last 50+ years about how students learn, how literacy practices operate, and how context shapes people’s use of practices and literacy skills. The field of literacy research has recently moved from emphasizing generic, wide reaching content-area literacy strategies (e.g., re-reading, think-out-loud, visualizing) to the theory of disciplinary literacy, which seeks to support students toward advanced literacies embedded in disciplinary inquiry, navigation across domains and disciplines, and meaning making true to the disciplinary domains. In essence, many of the generic strategies (coupled with additional specific strategies) that we know to aid comprehension and meaning-making are used within disciplinary contexts and for

disciplinary purposes. This shift occurred as literacy theory and research documented the importance of social and cultural context of literacy practices (e.g., RAND Reading Study Group, 2002). To provide background and as a way to situate the current landscape of K-12 education, I briefly describe the shifts in the field of literacy research that has developed the theory of disciplinary literacy and when applicable education theory and research that supported the development of this theory. The following sections provide additional examples about the strategies and approaches advanced through literacy and reading research.

Cognition and content area reading research. Beginning in the late 1870s through the 1970s and 1980s researchers focused on cognition emphasized the importance of schema, mental models, and memory as the foundations of comprehension of text. Out of this cognitive research tradition, strategies – tools for attention, memory and building schema for reading comprehension and monitoring – were advocated as approaches to support the teaching and learning of reading. Some of these included routines and strategies for monitoring information and memory (e.g., fix-up strategies, “lookbacks” during reading) (Alessi, Anderson & Goetz, 1979), metacognitive awareness, or thinking about one’s reading and thinking (Baker and Brown, 1984), and activating prior knowledge before reading and summarizing after reading. Cognitive research provided early insights into the process of text comprehension and offered strategies for students who may have needed support in early stages of reading.

As cognitive reading research was developing, a group of scholars were concomitantly considering questions of reading and literacy in various content areas. Researchers were investigating how reading, writing and thinking should be considered in

school contexts across various content area classrooms. Content area research sought to support students in accessing and comprehending classroom texts, readings, and textbooks using explicit strategy instruction. Alvermann and Moore (1991), in a review of secondary school literacy research, provide examples of content area literacy research targeting the use of summaries, graphic organizers, outlining, discussions, and teaching of vocabulary. Moore, Readence, and Rickelman (1983) noted, “content area reading instruction came about in recognition of the fact that readers require various strategies when they study particular subject areas...the primary missions of this instruction is to develop students reading-to-learn strategies” (p. 419). The emphasis in this movement was on explicit strategy instruction and the use of general or generic scaffolding to support students’ reading and use of text. There were concerns in this movement; within some areas of the literacy research community, scholars thought that this explicit strategy instruction focused heavily on comprehension, but not as a way to support students’ specialized literacies or to assist in student navigation of particular kinds of reading, writing, and thinking (e.g., Wilkinson & Son, 2011). Similarly, other researchers documented that these strategies were not often integrated into content learning in meaningful ways, if they were integrated at all (O’Brien, Stewart, & Moje, 1995; Phelps, 2005). Although explicit strategy instruction within content area reading research did attend to students’ need for support in reading, ultimately it lacked the domain- and context-specific attention to reading support that assisted in students’ meaning-making within and across discourses and domains.

Disciplinary literacy theory. In response to the general, and sometimes misapplied, comprehension strategy instruction advocated by content-area literacy approaches, researchers conceptualized and pursued a new vein of scholarship

investigating literacy practices that reflected those used within specific academic domains and disciplines and studied the implications of these practices for K-12 schooling.

Disciplinary literacy and its approach to literacy instruction centers on developing students' abilities to question, critically think, but also most importantly, participate in knowledge production and construction in a variety of domains (Moje, 2007, 2010, 2015; Shanahan & Shanahan, 2008; Young & Leinhardt, 1996). As Moje (2010) explains,

disciplinary literacy is:

the opportunity [for learners] to engage in the kinds of knowledge production and representation ... that members of the various disciplines enact on a regular basis. The point of such engagement is to make clear how disciplinary communities (or any discourse community, for that matter) produce knowledge, thereby enabling learners to question that knowledge (p. 275).

Beyond the noticeable importance for literacy skills, access to domain knowledge and the ability to question and produce knowledge in the disciplines is a social justice issue: a right to which all students should have access and educational opportunities to explore (Lee, 2004; Moje, 2007). Unlike the generalized practices emphasized in content-area literacy, disciplinary literacy scholars stress students' access to the specialized and particular "ways with words" held within a discipline (Heath, 1983; Lemke, 2001).

Before describing the most recent scholarship and research within disciplinary literacy and the implications for learning and teaching, I will briefly present two constructs developed within sociocultural theory—research and theory about *domains* and *disciplines*—which are two of the most relevant to understanding how literacies are organized and enacted. This will provide a basis for interpreting people's (including the young people in this study) experiences with reading, writing, thinking, reasoning, communication, and navigation in school and in life. Foregrounding these contexts

provides the foundation for interpreting the goals and approaches of disciplinary literacy theory for learning and teaching.

Domains. People's lives are organized in various social and cultural groups, and one must navigate among the various groups, norms, and practices as a part of daily life.

Domains, as theorized by to Gee (1990), are socially and culturally constructed groups that share literacy and language patterns, purposes, rules, norms, and practices, also called discourse communities. Discourse communities often share Discourses (capital D), which are the shared ways of knowing, thinking, organizing, speaking, and writing within different groups. People are able to learn the Discourses that are a part of domains through apprenticeship, observations, and participation. These Discourses are also malleable and mutable; through human participation, domains and Discourses can change, alter, and evolve over time. Academic disciplines, each also a domain, can be understood as groups with shared ways of knowing, ways with words, norms, practices, and processes of knowledge construction and production; therefore, the understandings of and participation in the practices of academic disciplines can be apprenticed by learners alongside experts (Lave & Wenger, 1991; Vygotsky, 1978).

Disciplines are specialized domains and are imbued with tacit rules about who is a member and how members behave in this domain and in which membership is exclusive and requires skill development and understanding of rules that only happens within the exclusive communities (Gee, 1990). Some have theorized that this apprenticeship within the specialized domains constitute "communities of practice," which are groups that share repertoires of practices that are refined within the context of the community and the group (Lave & Wenger, 1991; Lave, 1991; Wenger, 1998). Within the communities of practice

there are “newcomers” and “oldtimers” who engage in shared practices and intended learning within a social and cultural context. “Legitimate peripheral participation” is a term provided by Lave (1991) to describe how “newcomers develop a changing understanding of practice over time from improvised opportunities to participate peripherally in ongoing activities of the community” which occurs through the support by a full participant in the community (an oldtimer). Within a community of practice, in the case of this study a classroom enacting and engaging within a domain and discipline, “legitimate peripheral participation offers...the development of knowledgeable skill and identity” and “the process of assuming an identity ...as a full participant” (p. 68). This theory of learning assumes that apprenticeship and full participation requires support of oldtimers as newcomers move more and more toward the center of the community as they obtain, develop, and enact practices that are meaningful to the community. Within a discipline, this theory of learning advocates for ongoing development and participation in complex communities among those who are experts in the community and those who learn and apprentice to become expert. Disciplines represent types of domains that possess their own practices, tacit rules, and problems that drive investigations within the domains and the community members. To consider learning and teaching in academic disciplines and the nature of these domains, it is necessary to consider what is meant by a discipline and the practices that can be considered within and across them.

Disciplines. Researchers and educators have long considered the nature of disciplinary domains as a way to foreground the literacy practices within and across the disciplines. During the 1960s and 1970s there was a concerted effort made by theorists to understand the nature of the disciplines and the relationships among them (Dressel &

Mayhew, 1974; Hirst, 1972; Scheffler, 1965; Schwab, 1962, 1978). Out of this work, a disciplinary area was defined as “a body of knowledge with a reasonable logical taxonomy, a specialized vocabulary, an accepted body of theory, a systematic research strategy, and techniques for replication and validation” (Donald, 2002, p. 8; Dressel & Mayhew, 1974). Although disciplinary areas can be defined and delineated, theorists also highlight the dynamic nature of disciplines as human enterprises and the ways that disciplines change their stances over time (e.g., Becher, 1981; Clark, 1987).

Disciplines, as a system and a structure, can also be sources of power and control and can be viewed as impenetrable or immutable when access to domain knowledge and practices is restricted. Foucault (1977) argued that disciplines should be conceived of as comprised of the masses, and not the elite cadre of disciplinarians. The reason for this conception is that the masses are those on the receiving end of the depiction of methods and reasoning so meticulous and structured that they are wrongly thought to be impermeable and permanent. As Foucault (1977) and others argued, the disciplines should be transparent and accessible. Other critical theorists would likely clarify that these disciplinary cultures are also a means by which certain forms of cultural knowledge are maintained as scarce commodities and as possible sources of domination and exclusion (Bourdieu, 1984). In essence, there is a risk of reifying the practices and beliefs within domains if it teaches those “apprenticing” into the disciplines that these practices are fixed and impervious. In this way, providing access within these cultures and domains is critical. Domains and disciplines alike have the responsibility for developing agency and access within these cultures (Foucault, 1977), especially as it allows for the questioning,

constructing, and access of knowledge within the domain. Without advancing and providing access, the disciplines become sources of inequity and inaccessibility.

Recognizing disciplines as human enterprises, there are shared knowledge construction patterns within and across disciplines. Donald (2002) over multiple decades and across research studies, attempted to characterize the learning, thinking, and participation structures across disciplines and the similarities and differences among them. Using the Biglan (1973) dimensions of organizing disciplines, Donald (2002) describes disciplines and their location on the spectrum of hard and soft, and pure and applied domains. Hard or paradigmatic disciplines are characterized by a “logical structure, use of models and theoretical frameworks, and acknowledged models of inquiry,” and soft disciplines are “unrestricted and relatively unlimited field of phenomena, and the method of inquiry is idiosyncratic due to inherent complexity of the discipline’s studies” (pp. 8-9). Donald (2002) describes that pure domains as using specific models or theories to drive work, and applied disciplines as open to environmental complexity and eclecticism. Further, Donald (2002) describes applied areas of study, sometimes called “fields,” because “the phenomena they study are relatively unrestricted and the methods, frequently taken from other disciplines, both in traditional subject matter like history or English, and in the social sciences” (p. 10). Table 2.1 provides examples of disciplines and their placement along the dimensions based on Donald’s (2002) descriptions and integration of Biglan’s (1973) theories of disciplines.

Table 2.1 Donald's (2002) descriptions of disciplinary areas and their characteristics

Disciplinary Domain	Characteristics
Physics	Prototypical hard science, pure, paradigmatic,
Engineering	Hard, applied, concrete
Chemistry	Pure, hard scientific (applied branches; i.e., pharmacology)
Psychology	Range of hard to soft subareas, range of pure to applied, young discipline,
Law	Socratic, ancient discipline, hard with a combination of pure and applied outcomes
Education	Comprehensive, applied, represents a possible metadiscipline
English Literature	Interpretive, divergent, critical discipline

The modes of inquiry and methods of thinking also describe disciplines. For example, studies of biblical text or literature may apply hermeneutic interpretation to construct meaning from text (Donald, 1995). Problem solving could be applied to physics or engineering when steps for formulating a problem and enacting logical steps to ensure validity and reliability are used. Critical thinking could be applied to historical investigations using reasoned questioning in which one examines assumptions and seeks evidence (e.g., Middendorf & Pace, 2004). The modes and methods of inquiry directly relate to the larger epistemological purposes of a discipline (Neumann, 2003): what are the motivations and intentions of the discipline, and what knowledge does the discipline seek to uncover, produce, and construct?

Based on studies dating back many decades (e.g., Biglan, 1973; Kolb, 1981), disciplines can be understood as possessing specialized practices and can understand similarities and differences across characteristics, including: (a) topics of inquiry, (b) modes of inquiry, and (c) the literacy, thinking, knowledge, and communication practices used to engage in knowledge construction and production. For my purposes, I will define disciplines as organized domains with reasonably structured topics, modes, and methods of inquiry with shared practices for constructing, producing, and communicating meaning

within and outside disciplines (which may represent different communication methods, definitions, and construction of meaning).

Research in disciplinary literacy learning and instruction. Literacy practice is always context-specific and, in some sense, domain-specific, meaning people enact practices or approaches based on a given audience and a given purpose (RAND Reading Study Group, 2002; Scribner & Cole, 1981). Not surprisingly, education researchers and policymakers have marked the stark divide between the domains of school learning (i.e., science class, ELA class) and the practices of the academic disciplines (e.g., how scientists make meaning; how literary critics consider a poem). In other words, the practices that are true to the discipline are far removed from the way learners engage in meaning making in school domains and classrooms. Researchers have offered disciplinary literacy learning theory as a way to support students' navigation and abilities to participate in various domains. This would include supporting students' development of disciplinary-specific practices and skills to read, write, reason, and communicate, in order to critique existing knowledge and to construct new knowledge alongside others within and across disciplinary domains (e.g., Lee & Spratley, 2010; Moje, 2008, 2015).

Disciplinary literacy theory has been developed largely by studies of expert disciplinarians and their work with texts to construct knowledge and meaning. For example, historians' work is focused on reading, writing, and thinking about the past and the implication and connection to the present. This can involve investigating, gathering, and reading a wide variety of primary and secondary historical documents, and then offering conjectures and postulates in writing or in talk about the past (Leinhardt & Young, 1996; Paxton, 1999). Wineburg (1991) and Shanahan and Shanahan (2008) investigated

what historians do when they investigate and ask questions about the past and have also considered how these practices are different from novices, uncovering some expert practices including contextualizing, corroborating, and sourcing (Wineburg, 1991a; 1991b; 1998). Mathematicians engage in close reading and re-reading of texts to decipher error, structure, patterns, mathematical definitions, and inconsistencies as a way to attend to precision and representation (Ball, Hill, & Bass, 2005; Shanahan, Shanahan, & Misischia, 2011). Chemists and other natural scientists use texts to investigate data patterns, and then translate these data into various forms, graphical representations, and symbols; natural scientists often develop and use models to investigate the natural world (Pearson, Moje, & Greenleaf, 2010; Shanahan, Shanahan, & Misischia, 2011). Literary scholars use specialized practices (Lee & Spratley, 2010) with pieces of literature to investigate figurative meaning making (Peskin, 1998), and to seek patterns to construct literary “puzzles” and identify instances of “strangeness” within single texts or across texts (Rainey, 2017). Although reading, text use, and meaning-making may be an individual endeavor of an expert, throughout the process of using texts, disciplinarians tend to report attention to the larger social and cultural community of practice surrounding this knowledge production and construction. In other words, the disciplinary context and community is recognized and considered in this work (e.g., Draper & Siebert, 2004; Rainey, 2017; Shanahan & Shanahan, 2008).

Although some literacy practices are specialized within a discipline, some theorists have argued that all disciplinarians—within their communities—engage in similar overarching disciplinary practices to construct and produce new knowledge by engaging in inquiry cycles and knowledge construction cycles (e.g., Donald, 2002; Hirst, 1972). These

practices within these cycles are various flavors and are not identical, but instead are specific practices within overarching inquiry patterns and frameworks. Recently, expanding this scholarship and drawing on the scholarship about expert disciplinary practices, Moje (2015) put forth a heuristic describing disciplinary literacy practices that span academic, disciplinary domains. Moje (2015) argues that disciplinarians across domains *engage* in: (a) problem framing; (b) working with data; (c) analyzing, summarizing, synthesizing findings; (d) examining and evaluating claims; and (e) communicating, critiquing and sharing reasoning with others. These processes are iterative and recursive. These cycles of inquiry are the foundation of disciplinary work. Further, the empirical and theoretical work that names the specialized disciplinary practices of experts within domains could be situated within this inquiry frame and could serve as more specific examples of norms, language, and skills within domains. Although the cycle of inquiry can be shared patterns across disciplines and domains, within domains the approaches to these modes of inquiry are specific and specialized. For example, a historian may frame a problem or inquiry within a time period and seek to investigate this question; the historian will likely use primary sources, such as sources from archives and artifacts, from the time period as well as expert (secondary) commentary on this time period as well to investigate the question and develop an argument about what was happening at the time and what it means for today. The style and method of communicating findings would be particular to the historical community. The problem framing would be very different if a physicist was developing a question regarding motion and force and then gathering evidence to propose an explanation about this phenomenon. Explaining this argument to the scientific community would be specialized. Therefore, although the cycle of problem

framing, gathering evidence, and sharing reasoning with others are similar patterns, the “flavors” and literacies within are specialized, particular, and shared within the community of disciplinarians (Moje, 2015). The work of disciplinary literacy teaching and learning through empirical research and curriculum development is gaining insights, skills, and knowledge about how to engage in these literacies and develop skills that grow with sophistication over time and across contexts and domains (e.g., NRC, 2005).

Scaffolding, navigation, and agency. Disciplinary literacy teaching and learning (that is, how disciplinary literacy practices are taught and learned) has been the focus of a growing body of research. Scholars and educators have considered how to support students’ disciplinary literacy learning, across grade levels in K-12 education and in various domains, including in history (e.g., Bain, 2005, 2006; Monte-Sano, 2010; Reisman, 2012), in mathematics (e.g., Draper & Siebert, 2004), in science (e.g., Norris & Phillips, 2003; Roberts, 2007; Roth & Lee, 2004), and in literature (e.g., Rainey, 2017; Peskin, 1998). Although these studies are promising, as many researchers have expressed, these practices of disciplinary inquiry and disciplinary literacy learning are only rarely a part of classroom learning in K-12 classrooms (Carnegie Council, 2010; Moje, 2015; NRC, 2005).

A necessary feature of the disciplinary literacy teaching and learning research, like the studies outlined above, is the intentional support of students’ engagement in the disciplinary practices, what many educators and researchers refer to as “scaffolding.” Because students are not yet disciplinarians and are instead, “novice apprentices,” teachers must support their learning in developmentally appropriate ways (e.g., Rogoff, 1990) and in ways that make visible the often-times tacit and veiled practices of various disciplines. The earliest research of scaffolding described it as supports made and provided by a more

knowledge person to help a learner succeed in a task that would otherwise be out of reach (Wood, Bruner, & Ross, 1976). Wood, Bruner, and Ross (1976) offered the metaphor of scaffolding in response to the Vygotsky's notion of the zone of proximal development (ZPD). Vygotsky (1962, 1978) posited that learners benefit from the assistance of a "more knowledgeable other" (MKO). Vygotsky defined ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers" (p. 86). Scaffolding, therefore, is provided when a learner needs assistance with problem-solving. As Pea (2004) has elaborated, scaffolding is not just disciplinary tools that in the absence of these tools the engagement would be non-existent. Rather, scaffolding is the support that is targeted, specific, and meaningful based on individual learners' needs and the problem at hand. Scaffolding should look like supports that fade over time as these supports are no longer needed to engage in the task or activity (Pea, 2004). At this stage, the task likely increases with complexity and new scaffolds are provided to support engagement by the learner. Palincsar (1998) provided necessary nuance on the topic of scaffolding in classrooms by describing how within classrooms teachers likely have multiple and overlapping zones of proximal development among their learners. Borrowed from a model of reading development, a learner's ZPD on a given task or use of text would exist between what the student is able to do on her own (independence) and where, even with significant assistance would experience frustration and difficulty; this zone would be an instructional zone that scaffolding and support could be provided. Although widely used terms, ZPD and scaffolding are of necessary importance

when considering how learners engage in and are apprenticed into new domains – like disciplines – with the support of teachers as MKOs (e.g., Rogoff, 1990).

Providing further investigation and elaboration on the idea of scaffolding and apprenticeship in disciplinary literacy teaching, Moje’s (2015) “four ‘E’” heuristic defined the overarching inquiry cycles in which disciplinarians *engage* and also described three other “Es” that support disciplinary literacy learning through instruction in schools, which she calls *eliciting/engineering*, *examining*, and *evaluating*. *Eliciting/engineering* (referred to as *engineering* henceforth) refers to the scaffolding and support provided by teachers through tools, guides, and strategies that assist with the engagement of students in the reading, writing, thinking, communicating practices of a discipline.

Teacher’s *engineering* should be domain-specific and task/text specific and should meet the needs of learners at their various zones of development (in ZPD). In this heuristic, Moje (2015) provides a distinction between the disciplinary engagement in a task, in the way a disciplinarian might engage in the activity, and how teachers can support students to engage in this task using school-based and scaffolded learning toward these practices. Moje (2015) elaborates that engineering and scaffolding may take the shape of literacy strategies used across domains and content-areas; in this context, though, the skills and strategies could be framed within the inquiry cycle of the discipline. For example, student may use a graphic organizer to document comprehension and notes from a scientific article that they were reading to design a lab-based investigation of friction. The graphic organizer would be specific to the goals of the inquiry and would support students to engage with the text in meaningful ways for the larger disciplinary problem.

Moje's (2015) third and fourth 'Es' in her heuristic for disciplinary literacy teaching are *examining* and *evaluating*. Moje (2015) writes that examining is the practice of using and recognizing "words, phrases, and symbols in a given subject area...and the ways people use language" (p. 267). Examining language provides learners an opportunity to deeply consider the patterns and discourse within a domain or disciplinary community in a way that would otherwise remain tacit and ephemeral features of knowledge and communication. Linguistics and literacy researchers have considered the benefits of explicit analysis and discussion of language features within domains (Coffin, 2006; Halliday & Matthiessen, 2004; Schleppegrell, 2004). By uncovering the language in these ways, students are afforded opportunities for agency to deeply consider the knowledge, how it is communicated to audiences, how it is constructed, and opportunities to apprentice into these language uses. With ongoing opportunities for such engagement and understanding and participation in how knowledge is constructed and communicated, students are more agentic in their interpretation, engagements, and understanding of knowledge in the disciplines.

The fourth 'E' – *evaluating* – describes the cultural and social practices within a domain and how these are also translated across domains. Moje (2015) writes that evaluating is recognizing why, when, and how disciplinary discourses are useful and why, when, and how they are not useful" (p. 268). This is a construct that had been paid significantly less attention in schooling and disciplinary literacy learning. *Evaluating*, or what some have called students' skills of "navigating" (Alvermann & Moje, 2013; Moje, 2013), refers to supporting flexible literacies by supporting learners' skills and understandings about the different uses of language across domains. Students do, in their

daily life, navigate among the various domains and discourse communities that are a part of school and life. This intentional consideration of how one navigates among various communities – disciplinary cultures included – provides an educative space for students to explore these possibilities. The New London Group (1996) has used the term “multiliteracies” to describe the flexible participation in various discourse communities; the group elaborated that metadiscursive awareness, the recognition of and facility with various domains’ practices, becomes a crucial component of disciplinary literacy learning and instruction. Discursive navigation, multiliteracies, and metadiscursive awareness—the combination I will from now be referring to as *navigation*—are skills that allow for flexible participation and increased agency for students to make intentional choices about language and communication within and across various contexts. As it relates to agency and navigation, Moje (2013) explained:

...in addition to basic comprehension and composing skills, navigating involves listening, metacognition, meta-awareness, and critical thinking skills. Developing these skills also helps to develop agency among learners, and with the ability to navigate, the learner can decide if, when, and how they want to hybridize their practices and identities. Developing this meta-awareness distinguishes navigating from code switching because it moves from a responsive or tactical act of switching linguistic or other codes as the context demands it to actively navigating contexts in a strategic way as agents who decide how they want to be recognized or positioned.

Agency refers to the perspective often described within the field of social cognitive and sociocultural theory in which a person adopts the perspective that one can be a “producer of experiences and shaper of events” (Bandura, 2000). In this way, learners with agency will act with “intentionality and forethought,” and often with efficacy, when they engage in their actions, communications, and interactions (Bandura, 2000). Moje and Lewis (2007) describe agency as “the strategic making and remaking of selves, identities, activities, relationships, cultural tools and resources, and histories, as embedded within

relations of power. At times, but not always, the relations of power themselves are disrupted and re-made” (p. 8). Agency refers to the active engagement and possession of skills to advocate for oneself across various contexts. Linked closely to the ways that students and people move within various spaces is their social and cultural capital (Bourdieu, 1986; Bourdieu & Wacquant, 1992). Bourdieu (1992) defined social capital as “the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (p. 119). These capitals are leveraged as a part of agency and navigation as students recognize needs, skills, beneficial approaches, and goals; social and cultural capital also provide information about, understanding of, and depending on context, access to the power structures in society and ways to navigate and act agentially to engage or disengage in these structures, which can exist in particular ways in school contexts (e.g., Bourdieu & Passeron, 1977). Social and cultural capital is contextual and ebbs depending on the context that capital and agency is situated. Agency and privilege are related constructs because as people interact within social and cultural spaces the opportunities or access to different capitals (social, cultural, and others) are leveraged for one’s own benefit (Maxwell & Aggleton, 2013; Davey, 2012). Privilege is inequitably distributed in society and advantages some groups in contexts of power over others (Maxwell & Aggleton, 2013). Part of the work of schooling as a social enterprise is to empower students with agency and capital across academic and social contexts, so students possess these skills and capital to leverage across social and cultural spaces and contexts, thus lessening the inequities of society that exist as a result of privilege and power inequality; however, without questioning power structures and inequities, we risk

reifying the very structures that disadvantage groups of people in various contexts. Access to, inclusion within, and knowledge of disciplinary practices and domains empowers students within and outside schooling contexts to these often-restricted areas of knowledge and culture.

In sum, scaffolding does not mean the collapsing of disciplinary skills into generic literacy strategies. Rather, as Moje (2015) argued in her heuristic of disciplinary literacy, students should *engage* in the use of disciplinary literacy practices in the service of disciplinary inquiry, which involves problem framing, the use of multiple and complex texts, analysis, synthesis and critique of data, the communicating findings, and the cycle of revisiting the problem. Students should also be supported, Moje argued (2015), to *examine* and *evaluate* ways with words, features of language and the practices of language use within and across domains, in order to note similarities, differences, vocabulary, technical language, and cultural practices. This is done with scaffolding and *engineering* to meet needs of students. Paramount to the enactment of scaffolding and supporting navigation and agency in students is the recognition that disciplinary engagement is a cultural practice in a community of learners (e.g., Gee, 1990; Rogoff, 2003, 1994). Navigation an essential skill for students to interact in meaningful, agentic, and productive ways across the various domains in their lives.

In the next section, I consider the educational contexts of K-12 education and higher education as it relates to disciplinary literacy learning and teaching.

Educational Contexts: K-12 to Higher Education

Although there are standards urging for a new kind of teaching and learning centered on disciplinary meaning-making and literacy skills, many scholars have documented that students in K-12 classrooms rarely engage in deep disciplinary learning, like that described in the standards documents and disciplinary literacy scholarship (e.g., Carnegie Council, 2010). What's more, these standards document the disciplinary literacy skills students should enact within a single domain but says little else about how to assist students as they navigate among these various domains and learning expectations or how teachers can scaffold this process to develop more flexible literacy skills. The intention of these standards seems to be that by advancing disciplinary literacy and learning experiences students will be better prepared for the nature of the academic work in college and prepare them to possess skills for future literacy demands. But, once students reach college, it is unclear what students encounter as a part of their education and learning in higher education. What are students becoming *ready for*?

Theoretical, empirical, and political arguments about the “K-16 pipeline”—that is the goal of having all students gain access to higher education—have become all but ubiquitous. What is evident from this literature is that the elementary and secondary learning students' experience needs to have more explicit connections to postsecondary schooling. However, the image of a “pipeline” may be problematic as it signals that the pathway toward postsecondary education as unidirectional. College readiness and the pipeline image have come to mean that if students are well prepared in K-12 settings they are “ready” to take on the next tasks of college independently. A better interpretation of the K-16 pipelines is that readiness should mean students after K-12 are ready **to learn** how to

engage in the next tasks in college, but not yet entirely independently. This means that college instruction will support the continuation of this learning and development in even more sophisticated ways. Also absent from this “pipeline” image is what postsecondary institutions may learn from K-12 settings to support learning and teaching and establishing disciplinary learning goals and providing access for students. It also ignores the knowledge and skills that students develop and bring with them from high school into college and how college might further develop these skills and practices. Others have elaborated that the “pipeline” metaphor ignores the inequities and lack of educational opportunities that prevent this access. Instead of a pipeline, much like the notion of “college readiness,” we might consider the reciprocal relationship between higher education and K-12 schooling: What are the curricular reforms being urged in colleges and universities that would encourage access and success for all students? How can K-12 and higher education consider ways of making education meaningful and accessible for students, particularly encouraging and providing access to the tacit rules and practices within disciplines and domains? How might disciplinary literacy and K-12 standards provide a helpful lens to view higher education?

Higher Education

Although reforms at the K-12 level have focused heavily on setting high standards and holding teachers and students “accountable” to those standards, similar demands have not been made of those who teach at the post-secondary level. It is worth noting, however, that post-secondary students are held accountable for learning and specialization within domains, and without the similar demand for pedagogical success for those who teach them at the higher education level. Thus, in a matter of months, young people move from a

setting where teachers are assumed responsible for student outcomes to a setting where the students themselves are thought of and held as responsible for their own learning. What theory of learning assumes such a developmental shift within a three-month period? For that matter, what learning theory clearly defines what it means to be *ready* for college-level learning? And what pedagogical theory had been developed and tested to define the practices necessary to teach someone who is “college ready”? Who is studying the pedagogical practices of university instructors while also accounting for and adapting to the readiness of those students who have come to college to learn?

Attempts at measuring outcomes, success, or readiness for college have been captured in fractured and insufficient ways. In a recent survey to employers about students’ educational outcomes and workplace skills, the American Association of Colleges and Universities (AACU, 2015) found that employers reported that college and university graduates needed more opportunities for deeper learning within disciplines and fields, as well as across different domains to develop “cross-cutting skills that employers value” (AACU, 2015, p. 1). The most important skills for success in the workplace were ranked by employers in order of value: oral and written communication, teamwork skills, ethical decision-making, critical thinking, and the ability to apply knowledge to problems experienced in the world (AACU, 2015). Communication, collaborative work, critical thinking are all important outcomes of college. But, how are colleges and universities measuring outcomes for students?

Often researchers use prediction metrics in an attempt to forecast students’ college success based on high school grade point averages (i.e., GPAs), standardized assessments, or courses taken in high school (ACT, 2015). Other metrics measure success based on the

lack of remediation in coursework (Allen & Sconing, 2005), how long it takes for students to complete their degrees (Allen & Sconing, 2005), and if a student retains his/her major through college until graduation (Allen & Robbins, 2008, 2010). Other reports attempt to use developed standardized assessments to measure outcomes and knowledge of college graduates; however, these measures tend to treat literacy and knowledge as generic and non-specialized¹ (Baer, Cook, & Baldi, 2005). Further, these metrics do not consider what students actually experience when they enter college courses; success is defined often as being able to complete an entry-level course with proficiency but says little about what happens within these courses. These metrics also reflect little about what is encouraged or valued as outcomes of a college or university education.

Since the 1980s, several critical reports of higher education teaching and learning in the U.S. (Bennett, 1984; Boyer, 1987), including a recent report from the US Department of Education, *A Test of Leadership* (Spelling, 2006), have called for reform efforts. *A Test of Leadership* found that the general outcomes for student learning on college campuses “is inadequate, and in some cases, declining” (p. 3). Responses to these critical reports have largely focused on two strands: (1) documenting general education coursework, course offerings, accountability, processes of accreditation, and access to universities and across educational programs; and (2) educational process literature – that is, the realities and goals of teaching and learning in higher education. Reform efforts regarding educational process have urged for more attention to the quality of instruction and the pedagogical

¹ The American Institute of Research defined college-level literacy as proficiency in *prose, document, and quantitative literacy*; these literacies were described as the use of text for comprehension purposes (both continuous and non-continuous text) and quantitative skills to engage in everyday computations (i.e., estimation skills, generating tip). The report compared students across different institutional settings and among the general public.

approaches to support learners as they engage in academic work at the higher education level (e.g., Lattuca & Stark, 2009). One way to question the quality of instruction and learning is to consider the outcomes for students after college. A line of scholarship and empirical reviews have considered over the last twenty or so years what affect college has on students' lives. As others have elaborated (Walker, 2008), landmark studies in higher education such as *How College Affects Students* (Pascarella & Terenzini, 1991, 2005) and the *National Study of Students' Learning* (U.S. Department of Education, 2001) provide invaluable information about the effect of college on students; these reports primarily describe the factors that influence learning and the outcomes of learning more than the learning experiences themselves or ways to improve these outcomes.

When calling for curricular- and skill-based reforms, much of the higher education policy and research literature tends to emphasize the importance of general academic skills, often in a way that the breadth of skills makes it difficult to know the relative importance of each for success in college (Conley, 2007; Byrd & MacDonald, 2005), or the importance or purpose for each on learning within or across domains, courses, academic units, or future careers (Donald, 2002; Lattuca & Stark, 2009; Neumann, 2001; Neumann, Parry, & Becher, 2002). Higher educationalists and other education researchers lament that the studies of university teaching have largely focused on generic aspects of teaching methods, student learning, curriculum development, and assessment (Dunkin, 1995; Hativa, 1997; Neumann, 2001), without detailed attention to students' experiences (e.g., Tinto, 1999), disciplinary learning to be advanced in higher education (e.g. Donald, 2002), or best practices for creating coherent and useful learning experiences across coursework and activities (e.g., Lattuca & Stark, 2009).

Student experiences on college campuses. Aspects of these experiences have been researched as it relates to college transition and retention in college. Reports on higher education will often combine various issues and experiences of students in college contexts: surveying students on issues of access, self-efficacy, feelings of belonging, participation in college activities and community, financial support, and future goals (e.g., HERI; 2015a, 2015b). Researchers have determined that students are more likely to stay in an institution if they are connected to the “social and academic life of the institution” – what Tinto (1993) calls *integration*. Additionally, college retention and persistence also related to other personal identities and sense of self. Students matching with the culture and environment of their higher education institution, including matching well academically, socially, and geographically, can also influence retention along psychosocial and socio-emotional factors (Bandura, 1993; Rendon, 1994; Rendon, Jalomo, & Nora, 2000; Tierney, 1993). Researchers have also focused on the difficulties and challenges faced by communities that have been traditionally marginalized or those who have lacked access to higher education in the past, including first-generation college students (e.g., McCarron, Inkelas, 2006; Pascarella, Pierson, Wolniak, & Terenzini, 2004), students who learned English as a second language (Leki, 1991; Kasper, Babbitt, Mlynarczyk, Brinton, Rosenthal, 1999), and students of lower socioeconomic status (An, 2012; Walpole, 2003).

A small group of researchers have considered what students experience on college campuses in regards to life, academics, self-definition, trajectories, and cultural and social interactions. In their book, *Academically Adrift*, Arum and Roksa (2011) described the landscape of college learning and asked the question “how much learning happens once students are on college campuses?” The authors lamented that tools for assessing

knowledge gained in college are poor proxies or non-existent: grades are not true reflections due to inflation and cross-campus disagreement; professional and licensure exams only reflect those students who take them (and often in reality are poor reflections of what is needed as a practitioner in various fields); and self-reported surveys (e.g., *National Survey of Student Engagement* [NSSE]) used most often are filled with aspects of bias or generalities. Using a tool called College Learning Assessment² (CLA), Arum and Roksa (2011) assessed approximately 2,300 students in waves through college to determine the skills and knowledge gained within the first two years of college; they coupled these findings with survey responses and interviews with students. What Arum and Roska (2011) found were four trends across campuses during the first two years of college (p. 22):

1. Universities are often attended by students that the authors term “academically adrift,” who are students with generally low expectations and low priorities around learning;
2. Students’ outcomes in the CLA indicated disturbingly low gains after two of years of college, with 45% of students not gaining significant critical thinking or knowledge development over their first two years of college;
3. Individual learning in higher education is characterized by persistent and growing inequalities; and,
4. Although the overall level of learning is low, there are notable differences within and across institutions.

The authors call for vast improvements across college campuses, and for this review’s purposes two are most salient. First, the authors call for transparency and improvement in curriculum and instruction. The authors recognize that at this time, quality of instruction and curriculum are not externally monitored activities and would require

² The CLA is an assessment that consists of three open-ended components: a performance task and two analytical writing tasks. It was designed to assess “critical thinking, analytical reasoning, problem solving, and writing” (Arum & Roksa, 2011, p. 21).

reform from within the universities and colleges themselves. From their empirical work and other authors' findings (Chickering & Gamson, 1987; Kuh, 2003; NSSE³ framework), Arum and Roska (2011) provide five categories of effective practice that they argue should improve across campuses: (1) academic challenge; (2) active and collaborative learning; (3) student-faculty interaction; (4) enriching educational experiences; and, (5) supportive campus environments (p. 130). The authors provide case studies of institutions that have enacted aspects of these recommendations and have observed successes and gains among their students.

The second call is for the improved preparation of students in secondary school coupled with the support of the students once they arrive on college campuses. The authors echo similar calls from other reform efforts, especially as many students come to college underprepared for the academic demands of college learning. As Adelman (2009) found, secondary school preparation was the number one predictor of students' successful graduation from a four-year university. Arum and Roska (2011) indicate that the reform efforts happening in K-12 teaching and learning are progressing toward supporting students for college level learning. The authors believe there is a joint responsibility of the colleges and universities to support students once they arrive on campus, and not consider them entirely independent learners and thinkers. Arum and Roska (2011) indicate that supporting students and providing access to pathways through college can allow for the development of professional and intellectual goals and assist students in learning the

³ This is the National Survey of Student Engagement, a self-report survey by students across campuses (1,300 each year, now discontinued) to ask about engagement and satisfaction with college experiences.

cultural and social structures of college and the domains in which they study (e.g., Schneider & Stevenson, 1999).

Other researchers have also documented the phenomenon that Arum and Roska (2011) describe, students as “academically adrift.” Armstrong and Hamilton (2013) documented the trajectory of groups of female students living in one residential dorm at a public research university. Armstrong and Hamilton (2013) used background, college pathways, college experiences and trajectories to underscore the ways college made and reinforced inequities through social and cultural structures. Grisby (2009) found similar descriptions from students on college campuses in her ethnographic study of college students; students described that academics were “not the central focus” of their self-definitions as college students. Similarly, Grisby (2009) documented that students found many aspects of college learning “burdensome” and the need for general education requirements and other course requirements a process of “jumping through hoops.” In her study, Nathan (2005) lived as a student for one year as a freshman at the college campus where she taught; her experience documented the strain and stressors on students’ time to manage the various demands of navigating school, personal life, financial issues, and social interactions. These ethnographic researchers capture the complex realities of college life—the social, cultural, financial, personal and academic realities of students—and provide rich examples of experienced on college and university campuses from the students’ perspectives.

To this point, the brief review of higher education literature provides critically important information about the issues of higher education and outcomes of college. In reality although a rich field of research and recommendations exists about what *should* or

could happen in regards to college learning, in reality, as many researchers have lamented, we know painfully little about what happens across and within college classrooms (e.g., Lattuca & Stark, 1994; Middendorf & Pace, 2004; Neumann, 2001; Neumann, Parry, & Becher, 2003); we know little about the nature of the academic work, students' perspectives on the academic demands of college, the expectations of students and instructors, the supports for deeper learning and literacy tasks, and little is known about the pedagogical approaches that advance these goals.

“Deep learning” and academic literacies in higher education. In response to calls for reform and in an attempt to illustrate possibilities of teaching and learning in higher education, researchers have developed two promising lines of scholarship. The first is a line of scholarship focused on what the researchers call “deep learning” using various “approaches to learning” which leverage structures and pedagogical approaches to support deep learning in domains (e.g., Biggs, 1987, 1988; Entwistle & Ramsden, 2015/1983). This growing body of research suggests that students who “use deep approaches to learning tend to perform better as well as retain, integrate, and transfer information...than students using surface approach to learning” (Nelson-Laird, Shroup, Kuh, & Schwartz, 2008).

Researchers, borrowing from K-12 research and research in higher education, conclude that student-centered and deep learning environment would include (1) problem-based approaches, (2) activity, interaction, and engagement in academic work, (3) coaching role of teacher, and (4) knowledge which is regarded as a tool for learning and not the ultimate aim or goal (Dochy, Segers, Gijbels & Van den Bossche, 2002). Deep learning researchers have argued that lecture and exam-based instruction in college limits the opportunities for engaged learning in courses (e.g., Dochy, Segers, Gijbels & Van den Bossche, 2002; Prince,

2004). Researchers have also considered ways that disciplines and domain-areas in college (and the structures and traditions of the disciplines) can influence the approaches that professors use as a part of teaching (Donald, 2002; Lattuca & Stark, 1994; Laird, et al., 2008), arguing that disciplinary practices can be leveraged for deep learning in specific and engaging ways.

As Prince (2004) elaborated the teaching methods of deep learning emphasize student participation, problem-solving, engagement and often are presented as “opposite” or opposing traditional lectures where the teacher provides information that is passively received by students. This approach to teaching and learning also supplements the limited opportunities for and approaches to writing in college observed across university contexts (Melzer, 2014). The deep learning tradition of research has found that learning environments in higher education that include collaboration, student-driven inquiry, and a “coaching” role of a professor show higher satisfaction in learning and indication of greater learning gains by students than in lecture-based, passive higher education courses (e.g., Entwistle & Ramsden, 1983; Laird, et al., 2008).

A second promising line of research about teaching and learning in higher education comes from researchers in the UK and Europe; there is a growing body of research in higher education advocating for the theory of “academic literacies” to provide a pedagogical and organizational framework for higher education courses and institutions (Lea, 2004; Lea & Street, 2006; Street, 1997). This scholarship and the goals of academic literacies align closely with the goals of disciplinary literacy in the US. Recognizing the structure of colleges and universities around academic disciplines, academic literacies advocates for students and instructors to intentionally engage in the practices of

disciplines, especially for the use in writing and reading skills. The chief theorist of academic literacies, Street (2009) describes the approach to literacy in a university setting “views the institution in which academic practices take place as constituted in, and as sites of, discourse and power” (p. 349) and works to provide access of these academic literacies to learners. Further, he states, “from the student point of view a dominant feature of academic literacy practices is the requirement to switch practices between one setting and another, to deploy a repertoire of linguistic practices appropriately to each setting, and to handle the social meanings and identifies that each evokes” (p. 349). Theorists have argued for academic literacies and disciplinary learning to be an organizing framework for supporting students in academic writing (Lea, 2004) and other literacy activities across disciplines (Healey, 2000), and as a way to manage the gap between the expectations of instructors—those steeped deeply in the discipline and thus less likely to see academic work through the lens of a novice—and the student interpretation of what is involved in writing and reading in college across domains (Lea, 2004; Lea & Street, 2006; Street, 1997). Although academic literacies research largely has focused on writing across disciplinary domains, the theory and use in higher education provides a useful and promising example of what is possible in higher education as a framework for disciplinary teaching and learning outcomes, navigation, supports, and approaches.

The need to study disciplinary literacy in higher education and learning over time

As has been described, disciplinary literacy has become a beneficial theory for promoting meaningful literacy learning within and across academic domains and to prepare students for advanced literacies; many standards documents in K-12 settings are

promoting this kind of teaching and learning, specifically to support access to these advanced literacies and to prepare students for college and careers. And, although progress is being made, we do know that this kind of teaching has not reached most K-12 classrooms in the U.S. We know even less about nature of teaching and learning that is happening in colleges and universities, all while there are calls for reform efforts, improvement in access, and outcomes for learners in higher education. Certainly, among the various goals of higher education, there are some with much agreement: to prepare graduates to participate and meaningfully contribute in various workplace domains; to construct, advance, and question knowledge; and to contribute to society as informed and productive citizens. But, how are these goals met and advanced?

In higher education contexts, there remain gaps in empirical understandings of what students encounter as a part of their disciplinary learning, how they are supported (or the ways they are not supported) to engage in this learning, and if the learning in college is advancing understandings of disciplinary literacy within and across academic domains. Neumann (2001) argued for increased attention to disciplinary learning and teaching in colleges and universities:

The strong influence of disciplines on academics' beliefs, on teaching and on students' learning, would suggest that disciplines need to be subjected to greater systematic study, especially regarding their effect on the quality of teaching and learning in higher education. The capacity of such research to inform policy at both institutional and national levels is fundamental to the fair, effective and responsible governance of higher education. (p. 144).

Cultural learning, like the learning of cultural practices and skills like those of disciplinary domains, does not occur as a result of one class or one academic experience, but rather these experiences accrue and develop through participation and engagement over time and across experiences (e.g., Gee, 1990; Nasir, Roseberry, Warren, & Lee, 2014; Rogoff, 2003).

To better understand students' experiences in schooling, across domains, and their use of navigational skills, researchers must study and chronicle learners' experiences across space and time; Moje (2013) calls for this research as well, especially as it relates to navigation among the cultures, domains, and contexts of life and school:

I propose that in the act of following people researchers should focus less on the people themselves, and more on how the particular social and physical spaces of their daily lives demand or produce certain kinds of practices and on what people *do* and think and learn from those interactions and their responses to them. In other words, the unit of analysis should be on how, why, and when people navigate; on what sense they make of those navigations; and on what they do with that information as they navigate back and forth across spaces or to new and different spaces. Such research could contribute enormously to the literature because it would help to expose how people take up and employ new ways of reading, writing, and doing, which would provide teachers with information about how to teach those navigations to others. (p. 368)

Disciplinary literacy offers a promising theory for investigating the experiences of students in higher education environments especially given the changing landscape and inclusion of disciplinary literacy within high school contexts as an approach to preparing students for college. This dissertation study provides a case of disciplinary literacy teaching and learning within a secondary context and illustrations of what students bring with them to college after learning within a context as described in this study. The use of disciplinary literacy theory in higher education allows the field to consider what students are asked to do and learn in college, how students navigate the demands of academic learning in college, how they understand and engage in the domain-specific, language-based learning, how this learning accrues and influences the development of disciplinary literacy skills over time, and if and how students are positioned to critique and reason about disciplinary knowledge as a result of their engagement and learning in coursework.

Moje's (2013) call for research that focuses on "what people do and think and learn" and "how, why, and when people navigate" and the sense they make from these navigations. In essence, Moje is calling for studies like the study I have conducted for this dissertation: to travel with people over time and across spaces to understand how learners engage in academic tasks and learning, how they develop and navigate over time, and how they make sense of and experience their learning. This dissertation, by design, seeks to contribute to our understandings of disciplinary literacy learning, college readiness, college learning, and the academic trajectories and experiences of students. In the following chapter, I present the methodological decisions and design of this study used to achieve these aims.

CHAPTER III

Research Methods and Design

The goals of this study were: (a) to document the disciplinary literacy and learning experiences students had in high school in a context in which learning was approached in ways called for in education reform efforts, (b) to document the literacy and learning experiences students had in their first two years of college, and, (c) to analyze the ways students thought about the academic learning in high school and in college and how they navigated these contexts and constructed their own disciplinary and academic experiences.

As a reminder, the research questions guiding my study are:

1. How were the eleven “college-ready” students prepared for their college experiences during high school, in a context that used disciplinary literacy teaching and learning approaches within and across domains (as called for by many K-12 standards-based reform documents)?
2. What were the academic tasks and texts (i.e., the features, requirements, demands) these students encountered during the first two years of college?
 - a. What were the difficulties and challenges posed by the academic tasks in college?
 - b. To what extent did these tasks depend on disciplinary literacy skills?
 - c. How did the structures of college learning promote or restrict disciplinary practices and interactions?

3. How did students navigate the various academic challenges, language-based learning experiences, and difficulties they encountered in college?

To investigate my research questions, I used multiple qualitative methods of data collection and data analysis. I conducted longitudinal and periodic semi-structured interviews with each participant (Kahn & Cannell, 1957; Lincoln & Guba, 1985; Patton, 2002) and used a case study approach for analyzing learning experiences from high school and college (Stake, 2006; Yin, 2003). I also collected numerous artifacts from students used as a part of their high school courses' learning experiences, which included assignments, writing samples, lab reports, math problems, prompts, journals, tasks, texts, readings, and other artifacts (Patton, 2002). During high school, I used a brief questionnaire to learn about the reading and writing habits and perspectives of students both within and outside of school. I also supplemented the contextual data of high school with interviews of school faculty and leaders to compare and triangulate findings within the case study of high school learning. Similarly, I collected a wide range and large variety of artifacts from students during their first two years of college; I collected every course syllabi, all major writing samples, prompts, readings, powerpoint presentations, exams, quizzes, and any other documents students were willing to provide (Patton, 2002). In college, I used periodic daily diary "check-ins" during midterm and finals weeks (a total of 4 weeks of daily diaries collected for each student) (Mulligan, Schneider, & Wolfe, 2000). Through analysis, I used case studies to consider within and across case patterns. This took the shape of students' academic and disciplinary literacy experiences in the shared context of high school and then cases of disciplinary majors and the learning experiences in college.

Research Participants and Context

Contexts

This study involves a total of eleven students who attended the same secondary school, and who attended seven different higher education institutions. The middle and high school that the students attended and graduated from, called Pine Ridge School⁴, serves about 500 students. It is in a small, Midwestern town that is also home to a large research university. The school is private and tuition-based, and approximately 18% of the student body is on financial aid with an average award of half the price of tuition. On standardized tests such as the ACT, the average scores often exceeded national averages; on the ACT, for example, the composite score average among the schools' students was 28, about 7 points above the national average. On advanced placement exams 88% of the students at Pine Ridge School scored 3 or higher, and 72% scored 4 or 5. Students at Pine Ridge School scored much higher than national averages on AP exams (the national average of students scoring a 3 or higher across exams is 63%, and scoring a 4 or 5 is 21% and 19%, respectively).

As will be explored in much more detail in Chapter IV regarding the nature of high school learning, part of the school's mission and approach to curriculum is aimed at disciplinary literacy teaching and learning and a liberal arts-style education. The school in this sense addresses and strives for many of the K-12 learning standard reforms that call for deep engagement in reading, writing, thinking, and communication across disciplinary domains throughout high school. Schools addressing these reforms are rare; the

⁴ All school names and participant names are pseudonyms.

exceptional nature of this school is explored further in the case study presented in Chapter IV, especially as it illustrates the academic and language-based work that the students experienced within and across domains.

The higher education institutions that students decided to attend for college ranged in geographic area, institution type, size, and acceptance rate. Table 3.2 outlines the details of the institutions that the students attended during their first year of college and describes instances of transferring or leaving institutions if this occurred. Four of the students attended the same midwestern, research-one university that served about 28,000 undergraduate students and 8,000 graduate students. One student attended an Ivy League university and enrolled in the engineering college of this institution. Another student enrolled in an Institute for Science and Technology. Three students attended two different liberal arts institutions located in the Midwest. The final two students attended a research-three, public university in the Midwest. In the next sections, more will be described about the participants, their institutions, and further context about their educational experiences.

Recruitment

I originally recruited these eleven students during their junior year of high school to a study focused on disciplinary literacy learning across domains of high school. Initially, I did not have the intention of following these same students over time. Instead, the initial focus was to be on the last two years of high school and students' experiences in disciplinary literacy during these grades. To initiate recruitment for the high school portion of the study, I attended a grade level meeting and described my study to the junior class of whom about 40 students would have been eligible. I obtained parental consent and students' assent (as they were still minors) for participation during this time (the students'

junior year of high school). I provided incentives for participation for each interview of \$25 in the form of a gift card. After students enrolled in college, I re-consented the students into the continuation of the study and provided additional information about the longitudinal shape of the study. During each phase of the study, I had IRB approval and updated the IRB with information of the study and development and submitted new materials regarding students' participation. All eleven participants have continued with the study for the four-year time span. I continued to provide \$25 for each interview session.

Participants

By way of providing brief introductions to these young people, Table 3.1 provides some self-reported identities, interests, backgrounds, and goals developed using interviews, self-reported information on questionnaires, and young people's description of interests and backgrounds. These statements reflect responses to interview questions regarding identity and interest and indicate those salient identities that have developed and been described from high school into college. Certainly, more can be understood about the students through their own words and descriptions within the findings of the study, particularly within their academic contexts and experiences. The participants in this study represent a spectrum along measures of academic achievement in secondary school. At the point of graduating from high school, students' GPAs and class rank ranged from the lowest quarter, to the valedictorian of the class. However, even inside this spectrum, the students have educational experiences not typical in most schools. All students took multiple advanced placement and honors courses during school and all students exceeded the benchmarks of readiness on standardized assessments (ACT, 2015). All eleven students in this study graduated from Pine Ridge School and were accepted to multiple higher

education institutions. During interviews, the students described choosing a college based on the programs that aligned with future goals, desired majors, and financial decisions. The acceptance rates among the colleges that the students attend vary from about 9% to 70%.

Table 3.2 provides additional information regarding institution type, acceptance rates, and majors as of the most recent interview.

Table 3.1. Participants’ self-reported identities, backgrounds, and interests

Participant Pseudonym	Self-reported identity	Self-reported backgrounds & interests⁵
Wyatt	White, male	Enjoyed math and science, but also very interested in the classics and ancient history and mythology (Latin). Involved politically on his college campus and has been interested and engaged in debate and public speaking. Worked continuously in a biology research lab for over 3 years.
Jessica	White, female	Confident learner and voracious reader, family-oriented, academically interested in a variety of topics and demonstrated leadership skills and took leadership roles. Member of the Naval ROTC in college. Enjoys many topics in school, but especially sciences and writing.
Andrew	White, male	Motivated by school and especially interested in math and science. Described by friends as innately curious but also disciplined. Enjoys challenge and problem-solving. Involved in extra-curricular “tinkering” with friends on engineering and design, radio structures, and other scientific tools.
Erin	White, female	Social, enjoyed humor and time with friends, very interested in history and historical inquiry. Enjoyed reading a variety of text outside of school. Developed more interest in science and experiment design in college after working in a lab.
Shyloh ⁶	White, Non-binary, gender fluid, queer	Interested in social activism and social justice and takes active approach toward this involvement in social and equity issues, especially those involving queer and trans people’s rights.
Hope	Black female	Described high standards for herself in her learning and her mother (in the field of education) also had high standards for her in school. Socially involved and in a variety of organizations including diversity organizations and marketing and public relations on campus.
Jane	Black, female	Described herself as a logical person with a creative side. Humorous, enjoys the arts and performance, including music/singing, sketch comedy, dance, and theater. Involved extra-curricular in various groups in high school and college.

⁵ Background and interest statements were developed through summarizing interview information and questionnaire responses self-reported by each student.

⁶ Shyloh’s preferred pronouns are they/them/their. In places where gender specific pronouns would have been used, I will use the preferred pronouns.

Ryan	White, male	Described himself as responsible, outgoing and sociable. Enjoys economics and math. Involved in a variety of sports in high school and played baseball through college.
Cassie	White, female	Interested in theater and acting, leadership-oriented; Enjoys the process of English and history, particularly regarding analysis, and developed a deep interest in film.
Jennifer	Asian, female	Disciplined and goal-oriented, interested in English, humanities, and Latin as subject areas. Involved in sports and extra-curriculars including hockey in college and in high school. Reported not enjoying the culture of college.
Michelle	White, female	Described herself as a “helper” and someone who supports friends and is a good listener. Enjoys artistic pursuits and interactions with people. Described a tendency to get disorganized at times, but also loves reading and is dedicated to academics. Worked nearly full time in a local coffee shop and worked since graduation from high school.

Shulman (1986) argued that in educational research it is important to research “good cases” in order to understand not just what is probable, but what is possible. There are a host of reasons why a student may struggle or face challenges while engaging in literacy tasks during college. Students may have general literacy difficulties (i.e., lack of skills for basic text comprehension), have a lack of experience or background in the types tasks required in college, or lack experience with feedback or seeking help on work in school. For studying disciplinary literacy skills, the eleven participants in this study represent a kind of “best case scenario” of what students experience during secondary school and what they encounter in college; said another way, these students have experienced reading and writing across disciplinary domains, they have basic comprehension and fluent writing abilities, and by many (maybe even all) commonly used metrics are prepared and ready for college. I knew about this school because I was a former teacher in the school for four years and, in fact, was aware of the school even before teaching there because of the community’s high regard for the kind of teaching and learning that happened in this school community. Having worked in the school afforded me knowledge of this context. I also taught the students in this study as seventh graders in

history (this study began four years after I taught them). Although I had knowledge of the context and insider knowledge of the school, I had not systematically collected or considered projects or activities across courses, nor had I intentionally or from a research perspective asked students about how they made sense of the learning experiences in school. Because I saw the students engaging in disciplinary literacy activities and engaging in standards-based learning, I had confidence their experiences would provide fruitful examples of college readiness and disciplinary literacy learning; in other words, these students and this context made for “good cases.”

To describe what makes “good cases” of the possible, Jerome Bruner (1983) applied William James’ dictum – if one wants to study religion, “one should study the most religious man at his most religious moment” as a rationale for investigating active possibilities (p. 15). These students represent an example of a good case of investigating what is possible in disciplinary learning in college, fulfilling at least an example of James’ dictum. The participants in this study provide insight into the experiences of disciplinary literacy in college and the skills needed to navigate the various demands and capture an ideal experience in high school and distribute their experience across different college contexts to understand experiences across post-secondary contexts.

Table 3.2: Students' Selected Colleges and Universities, Acceptance Rates, and Majors

Participant Pseudonym	Postsecondary Institution	Acceptance Rate	Major as of most recent interview
Wyatt	Research 1 ⁷ , elite, public university	<30%	Cellular and molecular biology
Jessica	Ivy League University; member of the Navy ROTC	<10%	Chemical and mechanical engineering
Andrew	Institute of science and technology	<10%	Physics; possible math minor
Erin	Midwest liberal arts	<60%	Neuropsychology, focusing on neuroscience
Shyloh	Research 1, elite, public university	<30%	Social theory and practice major, and community and social change minor
Hope	Research 3, Midwestern state school	70%	Business, specializing in marketing and public relations
Jane	Research 1, elite, public university	<30%	International relations and Spanish double major
Ryan	Midwest liberal arts	<25%	Economics, considering philosophy minor
Cassie	Midwest liberal arts, dropped out, took time out, and then transferred universities; Research 1, elite, public university.	<25%/ <30%	Film studies major, dropped out of school and transferred into Film Studies program
Jennifer	Research 1, elite, public university. Sophomore year withdrew to join the Marines full time.	<30%	No major declared: Latin (300-400 level courses), anthropology, advanced statistics.
Michelle	Research 3, Midwestern state school – dismissed from school. Transferred (without college credit) to a local community college.	Community college 70%/ unrestricted acceptance	Interested in small business management, cultural anthropology and biology. Undeclared major.

⁷ Research I university refers to a classification used by Carnegie Classifications of Institutions of Higher Education to indicate universities that engage in extensive and highest amount of research activities. Research II means high research activities. Research III institutions engage in modern research activities.

University contexts

As displayed on Table 3.2, the students entered various postsecondary institutions, and reported selecting these schools based on interests, size, fit, and desired field of study. Some of the students enrolled in the same universities as could be noted by the descriptions and acceptance rates. Cassie and Ryan originally attended the same Midwest liberal arts college. Jennifer, Shyloh, Jane, and Wyatt originally attended the same Research I, university. Hope and Michelle attended the same Research III, Midwestern state school. The other participants matriculated to other colleges as is described. The range of students' universities and colleges span Ivy League and Institutes of Science and Technology, public universities, liberal arts colleges, and a community college. As will be elaborated further in the case studies and findings chapters of this dissertation, three students withdrew, transferred, or were dismissed from these original academic institutions and pursued other paths. I continued to interview students throughout the process regardless of their change in academic institution or status as a student. The cases further elaborate on the experiences of those who remained at their initial colleges and universities and their experiences in these contexts. Students described decisions around courses and enrollment in courses and trajectories in their coursework across years.

Data Collection

This study draws on data collected over a four-year period from the students' junior years in high school through their first two years in college; this study spanned the years of Fall 2013 to Summer 2017. The data collected during students' high school years was part of an initial study of disciplinary literacy learning experiences and served as contextual

data to understand and describe the disciplinary literacy experiences of these students from high school into college. The focal data was collected during the eleven students' first two years of college.

The contextual data collected in high school involved two interviews, the collection of artifacts of disciplinary literacy within and across courses, and a short questionnaire. I also supplemented by contextual data by interviewing three department chairs and school leaders at Pine Ridge School. The interviews with faculty were about an hour long and focused on the philosophy and approach to learning in the domains in which the department chair was the instructional leader. The school also provided me with vision documents, course guides, descriptions and other available materials to provide illustrations of the learning happening at Pine Ridge School. I collected students' writing samples, prompts, syllabi (when available in high school courses), discussion guides, project overviews, and the like from across courses during the students' junior and senior years.

The focal data collection took four main forms. First, I conducted interviews with participants at the end of each semester reflecting back on their work from the term. Second, I also collected artifacts, syllabi, materials, work samples, and prompts from students during the semester. Third, during the eleven students' sophomore years I conducted daily dairy "check-ins" during a midterm and finals' week in each semester. A total of four weeks was used for conducting daily diaries to document the various activities and skills used by students for various tasks. Finally, I asked participants to respond to a short questionnaire about their academic experiences and future plans. A more detailed description of each component of data collection is in what follows.

Contextual Data from Participants' High School Experiences

Semi-structured interviews and student questionnaire. Study activities were designed to document students' exposure to disciplinary literacy tasks in high school, to understand their interests and motivations around literacy tasks and texts, and to ask about the preparation they received to engage in disciplinary literacy activities across content areas. First, I designed a brief questionnaire that provided background information about the student, their beliefs about reading and writing within and across domains, and other information about how they thought about school (see Appendix A for student questionnaire excerpt). Following the questionnaire, the students and I engaged in two semi-structured interviews, each guided by an interview protocol (see Appendix A for each interview protocol); the first interview focused on their reading, writing, and thinking in- and out-of-school and how they understood disciplinary literacy within and across domains. The second interview focused on investigating students' previous writing in history from middle school and the comparison of that writing sample to a current historical essay from their US history course to describe how they used to think about history and how they think about it now. I interviewed students about general disciplinary literacy activities, specifically about reading and writing within domains and how students understood these as similar or different activities.

Artifacts. As a part of my data collection during the students' last two years of high school, I collected various artifacts, book lists, prompts, writing samples, course guides, and more to document the disciplinary literacy tasks and texts that were common within this high school setting. As explained before, I also interviewed three instructional leaders in the school who provides insights into course design, text and task approaches, and the

philosophy of learning held within the school. The interviews with department leaders were about an hour long each.

In 2014, I conducted a total of 22 interviews with the eleven students and it totaled about 16 hours of interview time. Table 3.3 describes the total duration for each student interview. Table 3.4 displays the labels and duration of department leader interviews. Interview protocols for the high school interviews and questionnaire details can be found on Appendix A.

Table 3.3: High school interviews

Participant Pseudonym	High School Interview Labels	Duration (in minutes)	Total minutes of interview by participant
Wyatt	Wyatt, interview, 1	38 mins	72 minutes
	Wyatt, interview, 2	34 mins	
Jessica	Jessica, interview, 1	45 mins	88 minutes
	Jessica, interview, 2	43 mins	
Andrew	Andrew, interview, 1	47 mins	90 minutes
	Andrew, interview, 2	70 mins	
Erin	Erin, interview, 1	36 mins	71 minutes
	Erin, interview, 2	35 mins	
Hope	Hope, interview, 1	23 min	97 minutes
	Hope, interview, 2	74 mins	
Jane	Jane, interview, 1	29 mins	77 minutes
	Jane, interview, 2	48 mins	
Shyloh	Shyloh, interview, 1	41 mins	86 minutes
	Shyloh, interview, 2	45 mins	
Ryan	Ryan, interview, 1	33 mins	80 minutes
	Ryan, interview, 2	47 mins	
Cassie	Cassie, interview, 1	35 mins	108 minutes
	Cassie, interview, 2	73 mins	
Jennifer	Jennifer, interview, 1	28 mins	66 minutes
	Jennifer, interview, 2	38 mins	
Michelle	Michelle, interview, 1	43 mins	90 minutes
	Michelle, interview, 2	47 mins	
			952 minutes (~16 hours)

Table 3.4: Department leader interviews

Department Leader Pseudonym	Interview Labels	Total minutes of interview by participant
Mr. Atkins	Mr. Atkins, interview, 1	52 minutes
Ms. Martin	Ms. Martin, interview, 1	56 minutes
Dr. Walker	Dr. Walker, interview, 1	55 minutes
		163 minutes (~2.7 hours)

Focal Data from Two Years of College

Semi-structured college interviews. Beginning their freshman year of college in Fall 2015, I conducted interviews with students after each semester of college. The interviews lasted approximately 70 to 80 minutes each. See table 3.5 for interview labels and duration by student. In total, I conducted about 55 hours of interviews with students to reflect on their learning experiences in college. During their freshman in college, I interviewed students using a semi-structured protocol to document the experiences of college coursework across domains, reading and writing expectations, difficulties, challenges, and navigation techniques among the various demands of college language-based and literacy work. During the students' sophomore years, I included questions that stimulated recall and retrospective analysis questions about previous coursework, feelings of frustration, and advice that students might have for future students' taking similar courses (or sequences of courses). The full semi-structured interview protocol, including additions of retrospective and stimulated recall questions, is provided on Appendix B. Throughout the findings chapters of this dissertation, I refer to the interviews by the "labels" on this chart to provide quick reference to the interview number for each student.

Table 3.5: College semi-structured Interviews, labels, and duration by student

	Freshman college interview labels (3 = after first semester, 4= after second semester)	Duration by interview	Sophomore college interview labels (5= after first semester, 6= after second semester)	Duration by interview	Totals	Artifacts from courses by student (including syllabi, exams, writing samples, prompts, readings, powerpoints from lecture)
Wyatt	Wyatt, interview, 3	73 mins	Wyatt, interview, 5	91 mins	312 minutes	145
	Wyatt, interview, 4	75 mins	Wyatt, interview, 6	73 mins		
Jessica	Jessica, interview, 3	71 mins	Jessica, interview, 5	85 mins	299 minutes	140
	Jessica, interview, 4	81 mins	Jessica, interview, 6	62 mins		
Andrew	Andrew, interview, 3	71 mins	Andrew, interview, 5	66 mins	312 minutes	400 (accessed number of resources through public documents)
	Andrew, interview, 4	98 mins	Andrew, interview, 6	77 mins		
Erin	Erin, interview, 3	74 mins	Erin, interview, 5	98 mins	353 minutes	88
	Erin, interview, 4	107 mins	Erin, interview, 6	74 mins		
Hope	Hope, interview, 3	101 mins	Hope, interview, 5	107 mins	368 minutes	101
	Hope, interview, 4	98 mins	Hope, interview, 6	62 mins		
Jane	Jane, interview, 3	57 mins	Jane, interview, 5	75 mins	264 minutes	205
	Jane, interview, 4	60 mins	Jane, interview, 6	72 mins		
Shyloh	Shyloh, interview, 3	56 mins	Shyloh, interview, 5	69 mins	240 minutes	110
	Shyloh, interview, 4	53 mins	Shyloh, interview, 6	62 mins		
Ryan	Ryan, interview, 3	63 mins	Ryan, interview, 5	84 mins	273 minutes	110
	Ryan, interview, 4	62 mins	Ryan, interview, 6	64 mins		
Cassie	Cassie, interview, 3	79 mins	Cassie, interview, 5	85 mins	312 minutes	91
	Cassie, interview, 4	106 mins	Cassie, interview, 6	42 mins		
Jennifer	Jennifer, interview, 3	45 mins	Jennifer, interview, 5	64 mins	209 minutes	38 (and artifacts from

	Jennifer, interview, 4	43 mins	Jennifer, interview, 6	57 mins		military training)
Michelle	Michelle, interview, 3	142* mins	Michelle, interview, 5	57 mins	326 minutes	52
	Michelle, interview, 4	75 mins	Michelle, interview, 6	52 mins		
		1,690 (~28.2 hours)		1,578 (~26.3 hours)	3,268 (~54.5 hours)	1,480 artifacts

Daily diaries. During the students’ sophomore year of college, I used daily diaries to document students’ “real time” experiences during their midterm and final weeks during their Fall 2016 and Spring 2017 semesters. Experience sampling method (ESM)⁸ uses questionnaire, diaries, or logs to document people’s engagement with task during the task, as opposed to retrospective accounts of what happened previously (Csikszentmihalyi & Larson, 2014; Hektner, Schmidt, Csikszentmihalyi, 2007; Mulligan, Schneider, & Wolfe, 2000). I designed a signal contingent method of surveying, which allowed me to reach out to students once per day, but at varying times, across two week-long periods of time in each semester (a total of four weeks of daily diaries were collected) (Hektner, Schmidt, Csikszentmihalyi, 2007). A signal contingent method is a sampling method that requests a response at a given time or date and often “signaled” by the researcher to the participants about when and how frequently to respond. Based on students’ academic calendars and syllabi, I developed a schedule of check-ins and determined the days that included the most variation in work, studying, projects, due dates, and assignments in their courses. During those weeks, I sent them the daily diary, designed to take less than 10 minutes of time, for

⁸ Education researchers have used diary-style data collection in various forms. Instructional logs have a long-standing history of documenting teachers’ instructional coverage using daily diary reporting to mitigate survey issues of misreporting and misremembering over longer periods of time. See Rowan, Camburn, and Correnti (2004) for a review of approaches of instructional logs in education research.

them to provide insights into the nature of the academic tasks, the literacy skills being used, and how prepared they felt to do the work. The questions were a combination of open-ended and closed types (i.e., free response & survey responses). As a way to capture the “dailyness” of the students’ experiences, I asked questions regarding previous and future tasks (i.e., what did you work on earlier? What do you plan to work on later today?). The total number of responses on daily diaries was 282 responses of a total of 305 requests about the nature of their academic work, the skills they used, and the feelings about the work. See Appendix C for daily diary questions.

Students requested to have these check-ins sent using a variety of platforms including social media, text messaging, and email. Response rates were high, but likely as a result of the adjustment of the original design; I originally had planned to request multiple responses per day, but found that this frequency was untenable given students’ schedules. Additionally, most often I found students (mentally and physically) organized their reflections, schedules, and approaches to academic work by day, and therefore this became an appropriate frequency for check-ins (once per day).

Syllabi and literacy artifact collection. One systematic collection of artifacts was of syllabi. I collected syllabi from every course that the students took over the two years in college. This mainstay of college courses provides important insights into the values of courses and the requirements for students within and across domains and institutions. During the semester, students would regularly share artifacts, projects, prompts, practice exams, graded work, problem sets, and other examples of college learning. During interviews, students would describe the “most challenging” and “most interesting” reading or assignment from the semester. Students would share these examples with me as well.

Students shared numerous artifacts, no fewer than 5 to 6 artifacts per course, but on average many more than that were provided. Total number of artifacts provided by student is described in Table 3.5, and the artifacts totaled 1,480 course artifacts from college.

Academic background questionnaire. As a way more systematically document academic information and other background details for each participant, I requested information using an academic background questionnaire. I asked participants about courses taken in high school, grade point average in high school and college, standardized test scores, declared majors, and experiences with literacy within and across domains. See Appendix D for the academic background questionnaire.

The data sources described above were used in the service of investigating the three major research questions, and the sub-questions, guiding this study. Table 3.6 displays the research questions focus and the data sources used to investigate each question and sub-question.

Table 3.6: Data sources and research questions

Research Questions	(1) Disciplinary Literacy and Inquiry Learning Experiences in High School	(2) College tasks and texts	(2a-c) Difficulties, challenges, nature of tasks, structures of college	(3) Students' navigation and difficulties
Data Sources				
Student Interviews in high school and college	X HS Interviews	X College Interviews	X College Interviews	X College Interviews
Department Leader Interviews (high school)	X			
Artifacts from courses (Syllabi, exams, projects, writing samples)	X	X	X	X
Questionnaires (one in high school and end of study)	X	X		
Daily diaries (collected during sophomore year of college)		X	X	X

Data Analysis

Data analysis occurred in multiple stages using qualitative methods. As a way to manage the large amount of information and data, I constructed an overall management system to support systematic analysis. I organized and stored data within the MBox site at the University of Michigan. Within the original folders, I had constructed shared online spaces between myself and each participant. This became a space for students to add artifacts and resources to various folders labeled by dates, courses, titles, and semesters. I digitized every resource I was given, including extended readings, coursepacks (with permission for digitization for research purposes), and artifacts. Using the syllabi collected from every course, I categorized the grading scheme for each course and analyzed the syllabi to determine patterns both within and across courses. I labeled the courses by type: (1) natural science, (2) social science, (3) English composition and literature, (4) humanities, and (5) world languages, and, (6) other. I documented texts used and listed across courses and coded them for use with tasks and purposes for reading and engaging with the texts. I documented the grading scheme for each course across categories, including, final exams, exams, quizzes, homework, projects, papers, and participation and attendance. Grades typically fit squarely into these categories; when I needed clarification about the nature of the work, I would ask questions during interviews for more description to classify the grades and assessment type. These data became the basis of analysis across all courses that students took during their first two years of college, the texts being read, and the assessments given within and across courses.

Following data preparation and I began analysis by transcribing all interviews, which were each audio recorded. This transcription served as an initial form of analysis.

Following this transcription and revisiting interviews, I engaged in Constant Comparative Analysis (CCA) using all interviews, academic artifacts, and daily diary entries (Glaser & Strauss, 1967), which is a method used within grounded theory research. This coding and analysis approach was used to generate findings and theory regarding disciplinary literacy, college learning, and college readiness. Using this method, I engaged in open coding across all data documenting themes within these data. After developing open codes, I engaged in analysis with axial or umbrella codes uniting open codes under larger categories of patterns and themes. Then, using selective coding, I checked and edited the codes and compared data courses using the refined code scheme.

Given the large corpus of artifacts and interviews, I will describe my approach to CCA in regards to the steps of comparison, coding, and ultimately triangulation in more detail. I began coding each student interview at each time point. Codes that resulted from individual interviews included details of learning experiences (i.e., nature of the work within and across courses at given time points, types of academic work within domains). Then, in a given time point during their interview, when a student described an aspect of learning, projects, or school artifacts, the artifacts from the course to code and compare with the interview excerpts; at this stage I coded artifacts such as assignments, writing samples, exams, and/or syllabi. Students daily diaries also served as important artifacts of how students reported learning experiences in real time. I coded these excerpts using the codes developed through interview and artifact analysis progressed through daily diaries by individual student and then over time. I then compared across students to compare learning and course experiences across courses and students. I treated daily diaries as a triangulation source if aspects were reported during interviews or as a source to

understand more about artifacts from courses. For example, in one instance, a student described the skills used for studying for an exam; then, I turned to the interview excerpts to understand how students reported this work – I compared these aspects and then analyzed the exam and the study guide itself to understand that nature of the exam. These comparisons, codes, and triangulation was repeated across students and across semesters. Then, I turned to code and compare across courses within and across time periods.

As I analyzed students' experiences within courses and across courses, I triangulated data from each data courses to characterize the nature of the literacy tasks and the ways the students engaged in these tasks. In others words, I compared students work samples, prompts, essays, problem sets as communicated from course materials. Constant Comparative Analysis (CCA) was an iterative and recursive process, and a process that increasingly refined the themes and patterns among these data.

Throughout the coding process, I “memoed” about my observations and used these to document thinking and analysis over time and as a way to document the longitudinal nature of these data and students' experiences (Maxwell, 2005). Additionally, to document the development of codes over time, I developed data charts to provide excerpts and data alongside commentary and descriptions. Table 3.7 provides one data chart example regarding natural science students' experiences in lab-based courses.

Not only did I document themes and patterns among the data, I used descriptive statistics about the methods of assessment and patterns among the learning structures across courses as a way to make sense of the 182 courses that were ultimately included in this study. Zero inclusive averages were taken to determine patterns among the weight and variety of assessments that dictated students grades and reflected the tasks in which

students most frequently engaged. Zero inclusive averages within these statistics means that if a component did not count for any aspect of the grades in courses, I averaged the course grades with this as a zero (instead as a missing element). I also documented class sizes, texts, semesters of courses, and primary and secondary teaching and learning structures of the courses.

As a way to document individual student's experiences as well as those shared experiences across students and across institutions, I engaged in analysis of data within cases (Stake, 2006; Yin, 2003) guided by constant comparative analysis approach (Glaser & Strauss, 1967). After developing axial and selective codes, I visited student data within individuals (individual student work, course experiences, details of learning, at a single point in time) and also across cases (across students with similar courses, similar major, across institutions, over time). By analyzing data within cases and across cases, I was able to document the ways that experiences remained unique and those that shared patterns among students' experiences across institutions, courses, and over time. Triangulation and comparison continued as I refined the cases. As a result, two cases were developed to illustrate the shared experiences of students within majors – natural sciences and social sciences. Additionally, a third case that outlined the experiences of students with alternative paths in college was described, a case that included three young people who left, dropped out, or were dismissed from colleges and all of whom reported shared and divergent patterns within their experiences.

Table: 3.7 Data category and coding example

Category: Literacy and Learning Experiences in Lab-based courses		
Semester/participant	Data/Evidence	Interpretive Commentary
Andrew, interview 3; 1 st semester college. Course – experimental chemistry course	it wasn't that different in what we were writing and how I thought about science, but it was more formal – we had a lab book and then I went home to type up the reports and answer even more extended analysis questions about the lab. I would say it was more formal as a final product. But, writing everything down and documenting during the lab is the same” (Andrew, interview 3).	<ul style="list-style-type: none"> • Student compared learning in high school and college • Felt prepared • Outlined the increased formality of this lab report writing • Did not note substantive difference in writing from high school to college
Jessica, interview 6; 4 th semester. Course - physics	Almost exactly the same [between high school and college], actually...It's always the post-lab questions that vary. Then you didn't always need a full lab write-up. Way less calculation based than high school, actually. In high school, we had to do a lot more calculations and show our calculations. Whereas, they didn't really care as much here... People were complaining about writing 2 full lab write-ups, whereas high school, we wrote up a full lab write-up every time and we did a lab every other week. They were due faster and we just had more analysis and details to attend to. The format was the same...Purpose: basic, one sentence. Explain the lab. Never did a materials section. Procedure, basically the same sort of thing. Specific numbers, yes. Past tense, explain the procedure, but assuming they have basic knowledge. Discussion, very similar to high school. It's an error discussion. Summary of your results, an explanation of the results. Explanation of any outliers, discussion of possible errors, and sometimes- We didn't really focus on this in college, but in high school we did applications for the future. (Jessica, interview, 6).	<ul style="list-style-type: none"> • Labs included writing and lab reports • Emphasized similarities in high school and college. • Felt more prepared than her peers • Knowledge of the structure and form of lab reports • College cared less about calculation-based explanations than high school seemed to

Reflexivity, Subjectivities, and Limitations. As a former teacher in this high school context and a teacher trained in disciplinary literacy instruction, I developed this line of research to investigate the experiences of students using disciplinary literacy and

inquiry approaches in high school and the experiences of these well-prepared students once in college. I saw the benefits of this kind of teaching as a secondary teacher myself, but I had not systematically considered the ways this would influence or support learners once in college. The students in this study saw me as an educator and also as a former teacher in their school. Throughout the research process, I described to the students that they should be honest regarding their experiences as I developed understandings of how students considered and thought about their learning in school and across contexts. We developed a rapport of researcher and participants built on shared understandings of their high school context and descriptions of their experiences once in college. Throughout this process, I constructed memos and reflections on my perspectives and used these opportunities to carefully consider my biases and ideas. In the analysis and findings, I describe how I made sense of the stories, artifacts, and ideas shared by students. In this way, my goal was to provide transparency and insight into the analysis and the careful consideration I gave this research endeavor and the findings constructed with students that I have known for many years.

The methods, as described above, were designed and enacted to mitigate threats to validity and researcher bias. However, I also intentionally engaged in various activities to further mitigate these issues. I used ongoing “memo-ing” to document my perspective as a researcher and document the process of data collection and analysis. Reflective memo writing and systematic reflection assisted with recognizing my own potential bias as a researcher (Maxwell, 2005). Throughout this process, I met with my advisor to discuss these budding research findings and look at these data together. Using these findings, I read and developed an even clearer understanding of what may be influencing the literacy

experiences of students in high school and into college. Further, I engaged in activities, such as development of a key linkage chart to document the relationships among these data, but also for the purposes of questioning and redesigning fit and findings among the stories of students' experiences. The key linkage chart will be used to outline the findings chapters and can be found at the start of Chapter IV in figure 4.1.

I want to acknowledge the limitations of this research effort. The group of students in this study shared a similar secondary education background, but who then attended a range of universities. In some ways, this could be considered a type of "maximum variation sampling." Instead of documenting work across institutions and experiences as a way to generalize, I rather seek to document the patterns that emerge despite institutional difference, domain-area of study, and other aspects and those patterns that were exceptional or disconfirming. The intention of this work is to provide increased nuance to the understanding of college readiness and images of disciplinary literacy (or lack thereof) in college and high school learning. A second limitation to consider is that this research effort privileges students' experiences and perspectives. These students report their own interpretation and experiences, and in this way does not provide the perspectives of professors or instructors (or their intentions behind texts, tasks, course structures, etc.). As a starting point, this study attempts to document students' experiences in navigating the various demands of college coursework and places these experiences at the center of the study. The study also lays the foundation for considering professor and instructor perspectives on disciplinary literacy learning within and across domains of college learning contexts.

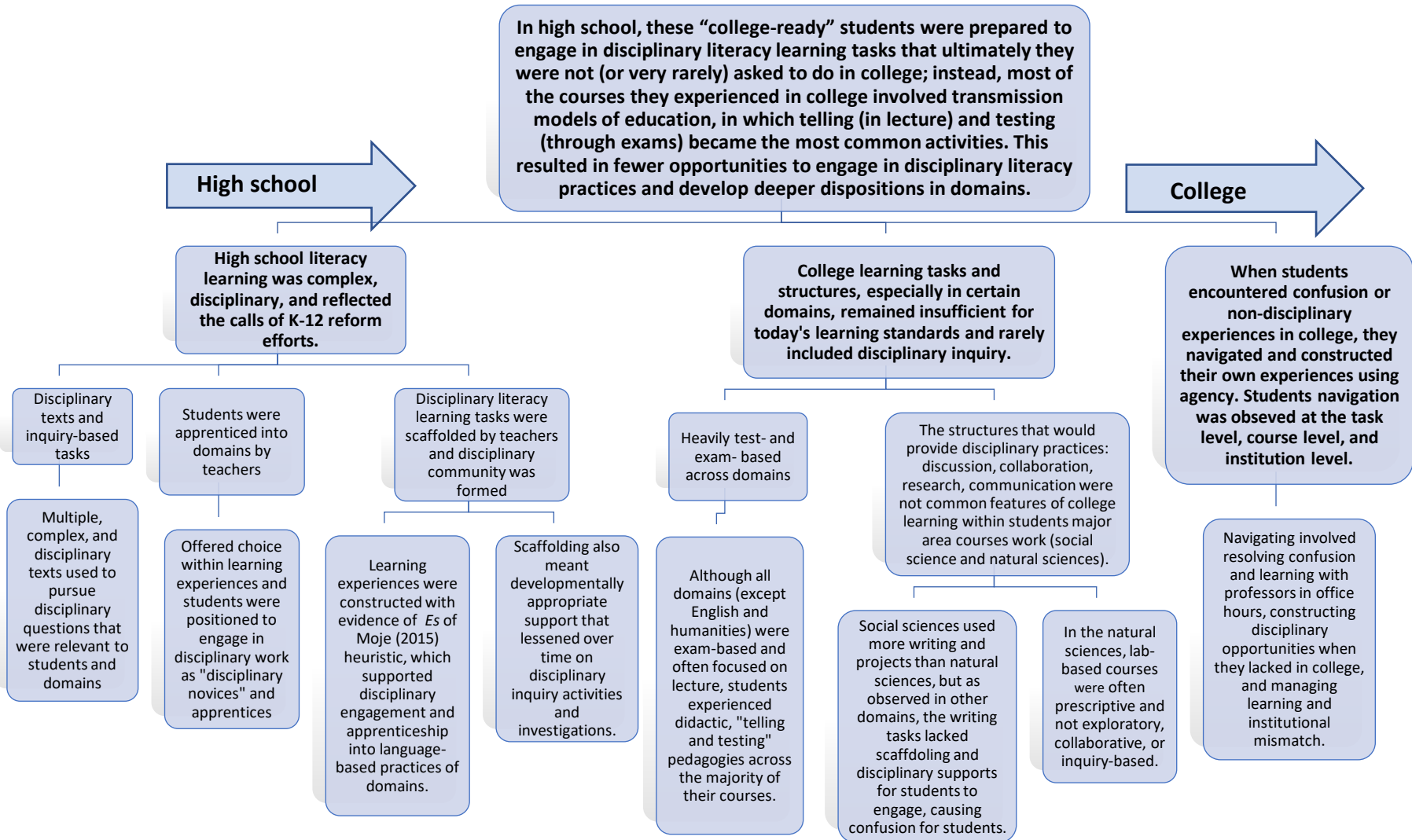
CHAPTER IV

Introduction to Findings: An Overview of Key Linkage Chart

In Chapters Four, Five, and Six, I present findings from this dissertation study. Data analysis showed the disciplinary literacy learning experiences that students had in high school were markedly different than those they had once they were in college. High school experiences were disciplinary-based and encouraged inquiry using multiple and complex disciplinary texts and tasks. In college, students largely encountered exam-based assessment and lecture-based teaching. Students reported limited experiences with discussion, collaboration, and writing across domains. The following key linkage chart (see Figure 4.1) represents the categories of findings and describes the outlines of the chapters that follow. Reading the chart from left to right also indicates the students' experiences over time: from high school into college. Once in college, I observed patterns within the disciplinary domains in which students majored, specifically, in the natural sciences and social sciences. Similarly, as students engaged in their learning in college, they navigated these contexts using their agency and social and cultural capital in specific ways. Another case of students, those who had alternative paths in college as a result of leaving, dropping out, being dismissed, or transferring shared instances of navigation at the institution level as they tried to manage their experiences.

The key linkage chart (see Figure 4.1) illustrates the findings presented in the chapters that follow and indicates the connections among the various categories, as well as the relationship of these data over time and contexts.

Figure 4.1: Key Linkage Chart



CHAPTER IV

How did high school make students “college-ready?” Disciplinary literacy and learning experiences at Pine Ridge School

In this chapter, I present an overview of the findings that describe the ways eleven students in a college-preparatory, disciplinary-focused school experienced literacy and learning opportunities across the domains of high school. More specifically, data analysis showed that the high school context of these students privileged the literacy and learning experiences that many standards-based reform movements are calling for in K-12 education. Through analysis of interviews, observations, and artifacts, I found that Pine Ridge School and its teachers enacted learning experiences that used disciplinary texts and inquiry-based tasks, positioned students *within* (and not outside) the domains they were learning as agents and “novice apprentices,” and scaffolded students to engage in developmentally appropriate ways with the tasks and texts of the domains. These were markers of an exceptional high school, but also as a model of the reform efforts underway within K-12 education. Based on the observations of this school, I considered: what were the disciplinary literacy learning experiences students reported in high school? What did students report learning through these tasks? How did teachers position students in relationship to the inquiry within domains, and how did teachers support them to engage in these domain-specific learning endeavors? In essence, what were students ready for after high school, and how did high school enact learning experiences to promote “college readiness”?

Most frequently, when college and career readiness is described, it refers to the academic skills and training that students possess upon entering college that serve as predictive measures that they can pursue courses without remediation during their first year of college. For my purposes, this definition is much too narrow and one-sided, placing the emphasis exclusively on K-12 schooling to develop students to be “independent” in college, and this definition does not include the necessary and intentional ways that academic, disciplinary practices and skills are developed and supported once in college. Instead, I define college readiness as the ability and support necessary for students to pursue, construct, produce, and question knowledge in a field of academic major of their choosing as they are supported by educators and professors to develop these domain-specific practices. Additionally, colleges are also responsible to be *ready* to support students in these endeavors and position students to engage deeply in disciplines and domains to develop skills and practices of disciplinary inquiry in accessible and meaningful ways.

Although the definition of college readiness most frequently used is narrow in focus, all eleven students in this study met every predictive marker of “readiness” commonly used in education and popular media. As a way of providing some background about the students, in the next section, I outline their scores and achievements on the often used predictive measures of “readiness.” Following this, I provide a deeper analysis of the high school experiences of students within and across their high school courses. I argue that the high school context—albeit a rare and privileged context—prepared students in the ways K-12 reform movements are encouraging; this high school context positioned the eleven young people (and their peers) to engage in rich disciplinary literacy learning across

domains of school. These learning opportunities influenced the ways students thought about learning upon entering college, which is explored toward the end of this chapter and is the main focus of chapter five. In these findings Chapters Four, Five, and Six, I explore and present illustrations of the expanded and nuanced definition of college readiness I propose and the implications and conclusions for high school and college literacy learning in Chapter Seven.

College Readiness Benchmarks

To begin, these eleven young people's standardized measures of academic learning and preparation through high school indicated that they met every typically used college readiness marker as they were about to matriculate to college. Commonly, research, policy, and popular media use benchmark scores on college entrance exams, advanced placement (AP) exams and courses, and number of years taken within given domains in high school as indicators for college readiness. The standardized measures illustrate the skills and achievement that these eleven students had before entering college.

College Entrance Exam

The eleven young people in this study each scored above the benchmark for college readiness on all four ACT exams: reading, mathematics, English, and science, or scored far above the equivalent percentile average on the SAT. The ACT college readiness indicator as of 2015 (the year the students took the exams toward college admission) was scoring above the 21.5 average across all four exams (ACT score report, 2015). Two students who only took the SAT scored in the 90th percentile or above and would have far exceeded the equivalent ACT benchmarks on all scores recommended as readiness markers.

As a reference, only 28% of students who take the ACT exams score above the college readiness benchmark on all four exams⁹. One student in the study, Hope, shared how she struggled with standardized test taking, but still scored above the readiness benchmark on all four exams (ACT score report, 2015). The other 10 students scored between the 80th and 99th percentiles on the ACT outcomes for their graduation year (2015). Appendix E provides more details of college entrance scores.

Advanced Placement Courses

Another predictive marker of college readiness is enrollment in Advanced Placement (AP) courses and scores on Advanced Placement exams as an indicator of knowledge and skills gained in the courses. In recent years, some have considered AP courses and exams to hold less value as an evidence of knowledge and skills gained in a particular domain (e.g., Sadler, Sonnert, Tai, & Klopfenstein, 2010). The variation in the courses themselves, after a period of rapid expansion, caused issues in the quality of instruction and preparation of students in some domains. There is some evidence that science AP courses indicate positive outcomes for college students in science, but many of the other domains do not indicate such gains or positive evidence (e.g., Matthews, 2007). Just as any standardized assessment, AP is an imperfect measure of exactly the skills gained and the value that should hold in college. However, many colleges, including the colleges and universities that the eleven students in this study eventually attended, used AP courses in admission decisions and for placement of students in more advanced courses. Therefore,

⁹ To further demonstrate the readiness of this group, nationally only 59% of the 2015 graduating class took the ACT test. Meaning only slightly more than half of all high school seniors took the ACT, and then scoring in the readiness levels in this test is even more rare. Therefore, the 11 students in this study represent a small population of students who test above the readiness markers on all four ACT exams.

scores on AP exams are used as evidence of readiness, academic skills, and college preparation experience. The AP scores and coursework of students should be considered so long as college and universities use these scores and coursework as a reflection of readiness, even if in limited ways.

All eleven young people in this study took at least one Advanced Placement (AP) course and exam during their time in high school; more often, the students took multiple AP courses and exams. The range of total AP courses and exams taken among the eleven students was between nine courses and one course, and on average the students took four AP courses and the accompanying exams. The eleven students took a total of 46 AP courses by the time they graduated high school. The range of AP exams and courses also illustrated the range of experiences and advanced coursework that the students took beyond the typical level of coursework recommended for college.

On the AP exams, all eleven students scored at least a '3' on each exam. For 20 of the AP courses, the students scored a '5' on the exam, and for another 11 courses the students scored a '4.' According to the College Board, the organization that creates AP coursework, curriculum, and exams, a score of a 3 means "qualified," which communicates that students are "capable of doing the work of an introductory-level course in a particular subject at college" (College Board, 2018). Further, College Board publications explain that scores of 3, 4, and 5 on AP exams can often grant credit for college and university coursework (College Board, 2018). For many of the courses that the eleven young people in this study took, the scores they earned on the exams were among the highest possible scores and among the highest of all test takers. See Appendix F for more details on AP exam scores and for details on the course and score by student.

It is worth noting that not all advanced courses were designated as AP courses at Pine Ridge School even if the students were prepared to take the AP exam. In my interviews with some faculty, they communicated that many departments did not want to feel bound to the AP curriculum and wanted flexibility to include what they thought would better prepare students for college courses and for college success. They saw the ability of the students to score well on the AP exams as a natural result of a well-designed course that did not necessarily have to follow the AP course curriculum provided by the College Board organization. Therefore, many students took the AP exams – and were encouraged to do so despite the courses not being designated as AP curriculum by name.

Standards Recommendations about High School Coursework

As was mentioned in the framing of this dissertation, several K-12 education standards are promoting preparing students’ “college and career readiness.” These documents also provide recommendations about classes and years of coursework to be prepared for college learning. As one example, the ACT College Readiness Benchmarks recommend that students take (a) at least four years of English in high school, and (b) at least 3 years of social studies, science, and mathematics.

Common Core State Standards (CCSS) in English recommends students take four years of English courses that focus on diversity and complexity of texts, tasks, and integration of learning standards of literature reading (fiction), informational text reading (non-fiction), writing, speaking and listening, and development of language skills (CCSSO, 2010). In mathematics, CCSS recommends that students could work toward achieving learning standards through a variety of pathways, but would likely include Algebra I during middle school, geometry, two algebra courses, and the possibility for “them to reach Calculus or

other college level courses by their senior year” (CCSSO, 2010). For social studies, at the recommendation of the *C3 Framework*, students should engage in “pathways” of courses that develop inquiry and domain-specific skills in economics, history, geography, and civics. In science, the *Next Generation Science Standards (NGSS)* indicates that all students should take a variety of courses to experience multiple domains of science but can choose various “pathways” through physical science, life science, earth and space science, and engineering, technology, and application of science.

The eleven young people in this study exceeded the years of coursework recommended by the ACT College Readiness Benchmarks in all subject domains, and I argue likely met many, if not all, of the learning standards of CCSS, NGSS, and the C3 Framework. High school courses heavily focused on the skills and domain-specific learning suggested within these standards. Every student in this study took 4 years or more (doubling up in some semesters on courses) of math, science, history, and English in high school. Every student, with the exception of one, took calculus before they graduated.

What these quantifications of years of coursework ignore, however, was the nature of the courses in high school and the ways that the courses met or exceeded the descriptions outlined in the standards documents—*CCSS, C3, NGSS*—that detail the learning standards and skills that should be at the core of classes in order to encourage and foster college and career readiness. So, although the students took advanced coursework and met the recommended number of years of courses in different domains, deeper analysis of high school learning among these eleven young people provided information about the learning and teaching that happened in these courses that encouraged students to be college-ready, and the disciplinary literacy skills and learning students experienced

within and across domains in high school. Thus, these courses provide information about the question “what were students **ready for** when they entered college based on their experiences in high school?” In the next section, I present findings of features from high school classrooms at Pine Ridge School that engaged students in disciplinary literacy learning and sought to prepare students for college and careers in the future.

Pine Ridge School: Learning and Teaching Context

In order to better understand and explore what prepared students to ultimately *possess* the readiness markers and indicators outlined above, I examined the high school courses and disciplinary literacy experiences of students. In this section, I present findings focused on the high school context of Pine Ridge School and the disciplinary learning experiences of the eleven students in this study. I detail patterns and findings about the overall culture and philosophy of the school, the individual classrooms, the ways students developed disciplinary dispositions and disciplinary literacy practices, and the evidence of disciplinary tools and scaffolding within and across these classrooms that supported disciplinary learning and literacy skills of these eleven students.

The Pine Ridge School philosophy and mission statement centered on providing a liberal arts education that emphasized the acquisition of knowledge, critical thinking, creative expression, and development of effective communication across contexts and supported students in realizing their potential in preparation for college and beyond. The school took enormous pride in providing a diverse curriculum that reached far beyond academic instruction to provide support and learning through performing arts, co-curricular (e.g., public speaking groups, theater, music, performed/studied in an out of

classrooms) and community-based programs. The school sought to cultivate a sense of social justice, a vision of responsibility, and an understanding of a broader context of life, which was communicated to me through multiple statement documents and artifacts of the school as well as interviews with students and faculty about the culture of this school. Within the school context, the disciplinary units and departments provided mission statements and goals that communicated to the students and the larger community the intention of teaching and learning within these domains.

Inside of this school context were departments, as there often are in schools. The departments also developed goals and statements about their approaches to teaching and learning. I observed that all departments situated their learning and teaching within the context of the disciplinary domain. Although every department shared domain-specific and disciplinary-inclusive visions and goals, the history and mathematics departments can serve as representative examples of what I observed across departments.

The history department described a vision of supporting students to develop historical thinking skills and practices and used overarching questions to guide course investigation. Some of the questions from the vision statements included: “what is important about the past? What has changed and what has remained the same? How do we make sense of artifacts and materials of the past? How do we interpret choices of predecessors who had different moral framework and worldviews?” (course guide, history). The mathematics department sought to promote dispositions toward math, including developing skills around “*practicing* effective techniques, finding resources and asking questions; *understanding* that mistakes and adjustments are a part of the method of mathematics; *gaining* effective communication skills to write about math with precision;

contextualizing the use of mathematics within other disciplines” (math vision statement, italics original).

The philosophy statements of departments provided contextual evidence of Pine Ridge High School and emphasized the goals and visions that this school believed to be the approach to best prepare students for college and career. The philosophy statements provide information at the “macro” level of the school. Within this context, the vision statements emphasized disciplinary learning, development of disciplinary practices, and inquiry. Although this did not mean that the school’s vision was universally the experience across courses, it does indicate at least a shared philosophy and goals of the school, the departments, school leadership, teachers, and students.

In the following section, I present findings from the students’ learning experiences across courses that highlighted disciplinary literacy learning, domain-specific practices, and inquiry. After analyzing the texts and tasks that students engaged in both within and across courses, I present findings about the disciplinary dispositions that students developed as a part of this inquiry and disciplinary learning. I found evidence of texts, tasks, and inquiry toward developing disciplinary knowledge and gaining understandings about the practices within the disciplines. These examples of disciplinary engagement, use of texts and tasks in the service of inquiry, are the kind of learning experiences encouraged by standards-based documents (CCSS, NGSS, C3), as well as researched-based practices for disciplinary literacy engagement (e.g., Lee & Spratley, 2010; Moje, 2015; RAND Reading Study Group, 2002). Finally, I describe the *engineering, examination and evaluation of language* (Moje, 2015), in other words the disciplinary tools, scaffolding, and language-based supports, provided by teachers for student engagement in domain specific practices

that occurred in his high school context across courses. This allowed students access to and development of specialized practices and skills within the domains they were learning and constructing knowledge.

These findings are drawn from the multiple interviews from the eleven students as well as from department chair interviews, questionnaires, analysis of assignments, school documents, readings, and other academic artifacts during students' junior and senior years of high school. Using constant comparative analysis (CCA), I engaged in cycles of coding and organizing the students' experiences and learning artifacts (Glaser & Strauss, 1967). It was common, however, for students to reference back to past experiences, even as early as middle school, to make sense of their current courses, writing, reading, and other disciplinary work. This provided additional examples of how the school constructed trajectories of learning and developed supports for engagement within and across disciplines in increasingly sophisticated ways. Students described the disciplinary reading, writing, speaking, and literacy experiences across domains to prepare them for college and beyond and the findings present their experiences and the artifacts that illustrate these learning and teaching examples.

High School Disciplinary Literacy Experiences

Through analysis of these data I found three recurrent components about the learning emphasized across high school courses:

- (1) the use of multiple, complex, and disciplinary texts to engage in disciplinary-focused, inquiry tasks (e.g., Moje, 2015, RAND Reading Study Group, 2002);
- (2) the development of disciplinary literacy skills, dispositions, and agency by positioning students as “newcomers” (novice apprentices) into the

disciplinary community of practice supported by their teachers/ “oldtimers;” (Lave & Wenger, 1991) and,

- (3) the use of learning supports and tools developed by teachers through *engineering* disciplinary experiences for students. These supports took the form of scaffolding, disciplinary tools, and the examination and evaluation of language (Moje, 2015).

Each of these aspects took place across domains, across courses, and over time for these eleven students in this high school context. Essentially, I found markers of the kind of teaching and learning encouraged by standards-based documents and by disciplinary literacy scholars. Moje’s (2015) heuristic serves as an organizing schema for presenting these findings and describing the benefit of these structures in Pine Ridge School’s classrooms. I found that students *engaged* in disciplinary inquiry using disciplinary texts and tasks. I found that students developed literacy skills and agency by being positioned as capable of engaging in domains and disciplines. Part of this increased sense of agency was through the *engineering* work conducted by teachers for students to gain access and experience support using scaffolding, disciplinary tools, and other literacy supports, like *examining and evaluating* language in and across domains, to develop disciplinary knowledge and literacies. Main findings of in this chapter are also located on the Key Linkage chart displayed at the beginning of chapter four (see Figure 4.1). The next section describes the texts and tasks that comprised the disciplinary learning experiences of the eleven students during their junior and senior years of high school.

Disciplinary texts used in the service of inquiry tasks. Students reported using a variety of texts across many of their classes and that they used them on a daily basis. Across subjects and domains in high school, students described the disciplinary texts that they read, engaged with, analyzed, synthesized, and used as resources motivated by the

disciplinary tasks of their courses. On periodic questionnaires, students reported that every class they took used texts (typically multiple texts) on a daily basis to engage in the disciplinary learning and work. The questionnaire used the scale “frequently,” “somewhat frequently,” “rarely” and “never” as the scale of frequency. The scale of daily routines included “daily,” “weekly” “monthly” and “every 2-3 months” and “never.” Averaging across the eleven young people’s responses, they reported that:

- They read texts “daily” in their classes and read at home “daily” for both school and personal enjoyment;
- They “frequently” read multiple texts in their classes;
- They read the same text over several days and weeks and “frequently” revisited texts with questions and ideas;
- They “frequently” used texts to aid in answering a question, write a paper, prepare for a discussion, and other academic activities; and,
- The purpose for using the text was “rarely” for memorization.

Students read and used multiple and varied texts as a part of their disciplinary learning at Pine Ridge School. For example, students read primary documents in history across topics, as well as secondary sources and accounts by historians about topics. In mathematics, students would read proofs written by mathematicians and historical proofs from Euclid to compare approaches and investigate the concept of proof. Another pattern that was revealed was that across courses when students were engaging with texts they did so in the service of a disciplinary inquiry or in the service of a disciplinary problem. Students and their teachers used texts to answer and consider questions or problems of the discipline. Students described asking and answering “big questions” about the texts they read and considering “large themes or puzzles” as they read. This means that students had a purpose for reading texts and used them in order to answer questions, ponder information, ask new questions, analyze, synthesize, construct an argument, and discuss

ideas. Students described how the texts, even textbooks, were questioned, considered, and analyzed. In a social science course on philosophy and history, students asked the questions, “do human beings need laws and governments to enforce them, or are governments and the people who comprise them a source of inequity and oppression? What would happen in a ‘state of nature’ where no one was in charge and no laws constrained us?” Students then read a series of philosophers, both modern and historical, to engage in this question using their own discussions, writing, reflection, and ideas. The course returned to these questions often and used them as guides through their texts and then chose specific aspects of them to write and discuss through the semester.

When asked on the questionnaire about the use of texts, students reported “rarely” being confused about why a text was being read in a class. Students also reported that they “agreed” that writing and reading differed across courses and disciplines and “varied based on why you were reading or writing.” The purpose for reading and writing was made visible for students through tasks and teacher-provided scaffolding and other disciplinary supports. Later in this chapter, I describe the ways the students were supported to engage in these tasks and access the texts through intentional scaffolding by the teacher.

Tasks, in this context, means the ways students used texts during their inquiry-based activities or investigations. At times, this meant that the students used the texts to write or construct an argument. Students reported a variety of writing, presenting, talking and other activities across courses. For example, in an anatomy course, students engaged in a recurrent injury investigation to understand how overuse injuries happen to people and advice that the students would provide based on scientific and anatomical knowledge about injuries. Students would discuss these injuries with a “patient” (played by another

student in the class) and had to write recommendations based on the needs of the patient after researching the issue in medical journals and other science texts from class. When asked about writing in particular, students reported writing “frequently” and reported writing in almost all courses on a very regular basis.

It would be impossible to list every text and task that I observed in the interviews, artifacts, and other documents from Pine Ridge School. See table 4.2 for the texts that I documented within the 11th grade courses of the students at Pine Ridge School and the associated tasks with these texts. The list provided is not comprehensive but it does provide a glimpse into the types of activities and texts that students regularly experienced in this high school environment; if anything, students experienced even more text use and tasks than is presented on this list. The table is organized by discipline and provides the tasks that students experienced and the range of texts they used, gathered, researched, and analyzed during this year.

Table 4.2: Texts and Tasks Across 11th grade Courses at Pine Ridge School

	Tasks/Activities	Texts used in various courses with inquiry tasks
English	<ul style="list-style-type: none"> Analytical writing that used a variety of texts to investigate meaning, themes, and ideas in English. Problems and puzzles were constructed by students, discussed in class, & revisited before writing and after writing. Revising of writing was expected and common; it was a recursive process among students themselves and with the teacher. An extended research analysis about secondary interpretations of a novel and the students’ own position on the analysis Constructing an argument evaluating author’s use of ethos, logos, and pathos in a literary analysis. Then, students constructed their own narrative using these features. 	<p><i>Teachers often selected their own excerpts and readings, which varied and included multiple readings for a given theme or investigation. In 11th grade some excerpts included:</i></p> <ul style="list-style-type: none"> Excerpts from accounts by British settlers Thomas Harriot and John Smith Excerpts from slave narratives Frederick Douglass and Harriet Jacobs Abolitionist writings Excerpts from “Nature” and “Self-Reliance” by Ralph Waldo Emerson The Birthmark” by Nathaniel Hawthorne Excerpts from Jacques Derrida & Michel Foucault “Sexy” by Jhumpa Lahiri

	<ul style="list-style-type: none"> • Creative writing that was constructed into a bounded book of short stories and poetry • Playwriting and development of a script and production notes to facilitate the execution of a production to an audience • Presentations/speeches that argued for a particular stance on an issue 	<ul style="list-style-type: none"> • “Passing” by Nella Larsen • Poetry by Walt Whitman and Emily Dickenson • Secondary literary analyses/criticisms of authors’ work <p>Novels</p> <ul style="list-style-type: none"> • <i>The Great Gatsby</i> by F. Scott Fitzgerald • <i>Middlesex</i> by Jeffrey Eugenides • <i>Playing in the Dark: Whiteness and the Literary Imagination</i> by Toni Morrison • <i>Moby Dick</i> by Herman Melville • <i>Uncle Tom’s Cabin</i> by Harriett Beecher Stowe
History	<ul style="list-style-type: none"> • Argumentative writing about a historical time period and historical figures’ roles • A student group led and facilitated discussion investigating ideas and approaches to historical text analysis and insights about the meaning of the text • Comparison and contrast between accounts from a text and how it is portrayed in their textbooks • Informal “quick writes” in class and offered students an opportunity to write ideas about a text before a discussion led by students • Students sourced materials from archival sources and documents to construct an argument about a time period. 	<ul style="list-style-type: none"> • <i>My Lai: A Brief History in Documents</i>, by James Olsen • <i>Democracy in America</i>, Alexis de Tocqueville • <i>Hull House</i>, Jane Addams • <i>Crabgrass Frontier: The Suburbanization of the United States</i>, by Kenneth Jackson • <i>The Social Contract</i>, by Jean-Jacques Rousseau • <i>Arc of Justice</i>, by Kevin Boyle • <i>Slave and Citizen: The Life of Frederick Douglass</i>, by Nathan Irvin Huggins • Numerous primary source documents to accompany different eras and across eras around different themes. • Students also used maps as reading and meaning-making tools often in their history courses
Mathematics	<ul style="list-style-type: none"> • Constructing proofs in math that students developed and analyzed in groups using collective problem solving • Descriptions and explanations presented to the class about an approach to a problem • Creating illustrations and graphical representations of mathematical principles using online tools and graphing by hand • Students gathering data using online tools to enact statistical analyses of a given topic; students defend decisions around survey questions, design, methodology, and results. • Engage in discussions (whole group and small group) about mathematical equations and expressions and construct meaning 	<ul style="list-style-type: none"> • Various teacher constructed course materials including graphical representations, problems, structures for documenting precise notetaking and problem-solving techniques. • The writings and papers of Georg Cantor (19th century mathematician). • MATLAB (online tool for plotting functions and data and for computation) • Writings from Islamic mathematicians regarding algebraic approaches. • Writings of G.H. Hardy on number theory and mathematical analysis. • Students also used mathematics textbooks; often as a reference material and for problems regarding

		<p>different mathematical principles. <i>Precalculus</i>, or</p> <ul style="list-style-type: none"> • <i>Calculus: Graphical, Numerical, Algebraic</i>, both by Finney, Demana, Waits, and Kennedy • Statistics used various texts and journal articles of published statistical analyses.
Science	<ul style="list-style-type: none"> • Enacting lab investigations about phenomena and driven by central questions of inquiry • Lab reports used across domains and specialization and parts adapted for different science domains and the specialized structures and approaches to explanations and theory. Feedback provided routinely on report writing. • Constructing models of various phenomena as a part of investigations or explanations • Students designing experiments to enacted in the lab / presented to the group for discussion and refinement • Group research into scientific topics and modeling approaches as it relates to energy use in the school building • Present findings about an injury in anatomy class and the recommendations for physical therapy knowing background on the anatomical structure of the injury 	<ul style="list-style-type: none"> • Textbook called <i>Chemistry: The Central Science</i> by Brown, LeMay, Bursten. • Mastering Chemistry online that supports lab work and textbook reading • “Molecular Structure of Nucleic Acids” by Watson & Crick (1953) • “The Replication of DNA in Escherichia Coli” by Meselson & Stahl (1958) • Various texts and journal articles that describe scientific experimentation and findings within core and research-based courses • Adapted materials that assist in textbook readings • <i>Campbell Biology</i>, by Jane Reece • Research an injury using medical and physical therapy journals in anatomy • Historical Hindenburg explosion footage (1937), (students constructed arguments using chemical understanding on their prediction of how this explosion happened)
World Languages	<ul style="list-style-type: none"> • Regular writing in a world language being studied. Students developed personal narratives as well as analyses using the world language being studied. • Classrooms were in constant exchanges using the world language. 	<ul style="list-style-type: none"> • Texts from the world language being studied including, examples included <i>Virgil</i>, Latin; <i>Don Quixote</i>, Spanish; <i>Le Petit Prince</i> in French • Films from the world language (students discussed the film as they watched portions) • Descriptions of cultural norms and valued within the cultures where these world languages exist
Observed across courses	<ul style="list-style-type: none"> • “Everyday Analysis Journal”- an analysis and argument-structured journaling using student-selected texts, readings, and other documents that spark ideas and insights for students, both in- and outside of class (further explained as a regular scaffold within the high school) • Public speaking across the curriculum – a teacher who specializes in speaking and oral argumentation integrates units of presentation across courses for different disciplinary purposes. For example, students engaged in a scientific presentation on the local watershed to a neighboring community that described how to keep the river and watershed healthy. 	

This list of 11th grade texts and tasks illustrated the disciplinary literacy learning that students experienced on a regular basis in high school. The texts are disciplinary in nature and include the use of textbooks alongside primary documents, disciplinary writings, historical texts, and most important, texts that would be used by disciplinarians as a part of understanding or engaging in their work and inquiry. Equally important, is the nature of the tasks aligned with texts. The tasks provide purpose for reading, for using sources, and for investigating. Students were using texts frequently and they were using these texts to inform and construct disciplinary problems and engage in disciplinary tasks. The purpose of this section was not to promote a curriculum or present this list as a singular approach to specific texts or activities. Rather, by presenting these texts and tasks, I want to convey the rich disciplinary nature of the school classrooms and overall environment.

To illustrate this pattern in a slightly more specific way, I provide a “snapshot” Wyatt’s assignments during the third marking period of his junior year. Those courses highlighted in blue serve as the examples *engineering* (Moje, 2015), disciplinary tools, and scaffolding that I will describe later in this chapter to illustrate how students were supported in detailed ways through these processes. See table 4.3 for a snapshot of one students’ texts and tasks in a marking period in 11th grade.

Table 4.3: “Snapshot” of Wyatt’s Third Marking Period Texts and Tasks in 11th grade

Course	Texts	Tasks
United States History	<p><i>My Lai: A Brief History with Documents</i>, by James Olsen, a collection of classified documents and other primary and secondary source materials from the Vietnam War and this era</p> <p>Archival resources online and in person from the Vietnam Era</p> <p>Newspapers, articles, and discussion of current war times</p>	<p>“Construct an argument about how an atrocity like My Lai could have happened during Vietnam? How can we prevent this from happening today?”</p> <p>Students engaged in several discussions in class understanding the context of Vietnam as a wartime and also cultural experiences in Vietnam itself, from the Vietnamese perspective. These discussions, and several opportunities for free writing, assisted students in gaining historical context on this topic.</p>
Advanced Chemistry	<p>Teacher-constructed inquiry task using various prompts and roles</p> <p>Various resources (i.e., energy data on the school, local energy companies information, data from other local entities and collected during lab activities, articles and resources on alternative energies and reducing energy use) that were student selected and driven by approaches to the disciplinary question.</p>	<p>“What would it take to get your school off ‘the grid?’”</p> <p>Inside this question, there were multiple persuuable questions constructed by the teacher to support the students (detail provided in later section on scaffolding)</p> <p>Students researched approaches, lab-based tests, collected data, organized findings, and presented results.</p>
English	<p><i>The Great Gatsby</i></p> <p>Student research about various aspects of <i>Gatsby</i> including scholarly articles about interpretations of the text, about the time period it was written, and about political and cultural commentary.</p> <p>Short story exemplars</p>	<p>“The research essays based on <i>The Great Gatsby</i> will explore a topic generated by the individual student and will be workshopped during class in small groups at various stages. Research may take various forms and can be discussed individually to tailor investigations for students. The final research essay will be accompanied by a reflection on the writing process. Students will also be asked to compose an original creative short story after studying the genre” (English 11 prompt, p. 1).</p>
Latin	<p>Virgil’s <i>Aeneid</i></p> <p>Latin scholar’s translation of lines of <i>Aeneid</i> and commentary</p>	<p>Students conduct their own translation(s) of <i>Aeneid</i> and write commentary on choices made in the translation</p>
Mathematics – Calculus AB	<p>“Beautiful Graphs,” teacher constructed text used for collective problem solving and graphical interpretation</p> <p><i>Foerester</i> Calculus textbook (used as reference material)</p>	<p>Students engage in the exercise and problem solving using pre-calculus knowledge, and then after learning approaches to transcendental functions. Illustrated the elegance of math problem-solving.</p>

<p>Statistics</p>	<p>Teacher constructed project</p> <p>Examples from popular media of data presentations</p> <p>Textbook in Statistics</p> <p>Analysis of scholarly statistical work to consider approaches to investigating phenomena and reporting results</p>	<p>Developed a survey about an issue that mattered to the students. Disseminated using online tools. Collected and analyzed data.</p> <p>Interpreted strong, convincing, weak and flawed presentations of data in popular media in a statistical paper-style report and presentation.</p>
<p>Scientific Research</p>	<p>Students join a scientific lab or science-based organization to learn about research processes; semester long course and summer internship. Texts that were used would be specific to the lab they were learning within, but often included scientific articles, data collection, record keeping, and writing out of the lab work.</p>	<p>During the school year, students learn about different methodologies, approaches to scientific research, and ways that findings are disseminated to the public. Students prepare to intern in labs and organizations and then present on a research project they engaged in while in the lab/organization. As the teacher wrote on the course guide, “students will conduct a statistical analysis of their data carry out background reading on their research topic.” Students then wrote a formal research article modeled on a professional scientific journal. The article included an abstract, background, materials and methods, results, conclusions, and bibliography. Again, elaborated in the course guide, “the course will conclude with a research project presentation to next year’s prospective research students at the end of the fall semester” (course guide, p. 84).</p>

Wyatt experienced diversity in text types and tasks through the third marking period of his junior year in high school. The tasks that Wyatt engaged in were disciplinary in nature; they required specific practices of the domains. In history, analysis of source material and determination of the what happened during a tragedy in our history requires historical thinking, corroboration across accounts, sourcing authors, as well as an analytical eye toward bias, perspective, and the social and cultural framework of the time period. In calculus, talking with peers regarding functions and graphical representations of functions requires precision, perseverance, willingness for error and redesign, and the use of mathematical background knowledge and insight to seek out new approaches. And, I could

continue with an explanation of each domain's use of disciplinary practices as being reflected in these examples. The most important feature of these tasks and texts, however, was in the problem framing and focus on inquiry. These were inquiry-based endeavors and were student-centered and students engaged and investigated their ideas in regards to the larger disciplinary problem being considered. Students did not just experience this in a few classes, but rather across courses and over time. This snapshot could have been repeated for each marking period and the representative pattern of disciplinary inquiry using texts and tasks would be the same. This learning would not have been possible without robust and ongoing scaffolding by their teachers, which is a topic that will be explored in a later section of this chapter.

Disciplinary learning using texts and tasks, like those outlined above, encouraged students to develop disciplinary dispositions and disciplinary practices and skills. In the next section, I explore the ways students thought about their learning and engagement with these tasks and texts and the dispositions and skills they felt resulted from this learning.

Disciplinary Literacy Skills, Agency, and Apprenticeship

Multiple, disciplinary, and complex texts used to pursue disciplinary questions were not just interesting teaching and learning experiences; the texts and tasks also provided opportunities for students to develop disciplinary literacy skills and dispositions as capable and valued "novice" members of the disciplines in which they were learning. During interviews, students revealed and described the resulting disciplinary literacy skills and disciplinary dispositions that the tasks and texts promoted as a result of this engagement and text use. I also found that the use of choice within projects and apprenticeship

positioned students as agents within domains. By choice, I mean the open-ended nature of inquiry for students to pursue question and lines of inquiry of interest to them. By apprenticeship, I mean the positioning of students as “newcomers” capable and important “novices” within the discipline each of whom would learn alongside the teacher (disciplinary expert) in these domains. Teachers designed classrooms to include student voice, perspectives, and ideas. This section explores the descriptions from students about their disciplinary literacy skill development, their feelings of choice and apprenticeship in these domains, and the development of disciplinary dispositions.

Reflecting on disciplinary literacy skills. When asked about the kinds of reading and writing students did for school, the young people were able to describe the purpose of texts, the reasons for writing, and the skills they used to approach the tasks and how these approaches varied across domains and disciplines. During high school, these young people recognized the ways they used their literacy skills in specialized ways. The students described the ways courses shaped how they thought about reading and writing and how they approached the disciplinary literacy tasks across courses.

During interviews, students described their processes for using texts in the service of their disciplinary inquiry tasks. For example, students described ways that they synthesized across texts to formulate a “thesis” or overarching claim about the texts. In analyzing the artifacts from the courses, I also found that the teachers described methods of synthesis across texts. In one example in English, when students wrote *The Great Gatsby* analysis using scholars’ literary analysis as evidence alongside the text, students used “mapping” to synthesize arguments across and among the various texts, a technique provided by their teacher as they engaged in reading and notetaking (pre-writing).

Students were nuanced in their descriptions of how they used evidence to substantiate claims and they often recognized the specialized and disciplinary ways evidence can be used, especially in writing. To provide one example, Jessica explained her writing across courses during her junior year:

We also have our formal essays and analysis. I guess the kind of essay format translates over into history, which is a lot more, "Read this and discuss what has happened." There's a lot more identification. That's a lot more research-based, and less opinionated. Depending on the unit that we're doing, there is still some room for personal interpretation... We actually do a fair bit of writing in Spanish. That's mostly creative writing, which I really enjoy. We do some writing in AP bio, but that's mostly just analysis. (Jessica, interview, 2).

As Jessica illustrated, students thought about writing across contexts and how this writing, even extended essay writing, varied for different courses. They had strategies about how to formulate the structure of writing essays and extended texts. As Jessica described, the students interpreted writing approaches based on discipline and type (i.e., formal essays, analysis, identification, research-based, personal interpretation, creative writing). They also reported strategies about how they tracked their thinking in reading, including note-taking and marking importance and points of interest. One example that several students described was annotating texts while they read to document themes, moments of interest and confusion (a skill they learned in middle and high school and called "active reading"). These strategies were used in service of the inquiry tasks which drove the use of these tools. In what follows, I provide three students excerpts to offer extended examples of how students thought about their disciplinary literacy learning and how they used skills to engage in inquiry-based activities.

During her junior year interview, Jane explained that writing in different classes helped her to have more flexibility in her writing and more knowledge about using texts in writing:

This year, my English class is really writing based. We have two to three major formal writing assignments and four to six journal-like, informal assignments per marking period. I'm essentially always writing for that class. We are also always reading...and then analyzing, discussing the texts we read. Whereas in US history this year, we have one, maybe two, formal writing assignments per marking period and those are based on a longer historical book we used – like this year we used *Killer Angels*. Before we wrote the essay, we discussed a lot about this time period and put it into context, which was necessary to be able to write about it. Because [the book] was more of a narrative style, but also historical. We discussed this a lot. [We] do the formal stuff that's at the core of most curriculum, but we also have room to explore different types of writing. (Jane, interview 2)

Jane explained her experience, and in some ways compared her experiences, in English and history classes. Jane explained that writing was a regular part of work in both English and history. Closely related was the use of rich, multiple, and disciplinary texts *used to write* the assignments. She noted how they do the formal essays, but how in her courses she has “room to explore different types of writing” and emphasizes how the reading and writing in her courses are linked. Jane also described the way she and her classmates her United States history course “discussed a lot about the time period...which was necessary to be able to write about it.” Most important, she never separated the use of the texts from the purpose in her descriptions – it may have been a writing assignment, or it may have been discussion, or another project.

Jane mentioned “always reading” and “always writing” for these classes and the process sounded connected, intentional, and discipline specific. As I analyzed the texts and artifacts that Jane referenced I found that the prompts for discussion in English asked

students to locate text excerpts to support claims made in analyzing the text, a specialized skill in literary analysis. To document their thinking and argumentation, their English teacher also used what the school called “Everyday Analysis Journals” (pseudonyms of the journal), in which students wrote 250- to 500-word entries describing claims and evidence that the students informally develop in journal style writing. Out of these journals, students may develop more extended analyses and essays related to texts from class and/or of their choosing. The use of multiple texts, multiple opportunities to write formally and informally, and opportunities to develop analyses and arguments about text advanced students’ engagement in disciplinary inquiry in English (Lee & Spratley, 2010). In history, Jane described using discussion of context and reading about the time period to interpret the “historical book” *Killer Angels*. The teacher provided opportunities for the students to engage in contextualization (Reisman & Wineburg, 2008; Wineburg, 1991) and interpretation of the genre of this book in a history class. As Jane stated, “it was necessary” to put the book in context before writing about it, illustrating the knowledge she was gaining about disciplinary knowledge construction and argumentation in history (in other words, knowledge must be gained outside the historical text in order to understand the context within the text).

Some may expect the varied kind of reading and writing that Jane described to be a typical feature of English and history courses, but oftentimes writing and reading disciplinary texts is even less common in natural science courses (e.g., Alvermann & Moore, 1991; O’Brien, Stewart, & Moje, 1995; Phelps, 2005). In this excerpt, Andrew elaborates further about the reading and writing in science courses and how the literacy experiences are specific to the kind of science being learned:

In physics...we write explanations; for example, why is this true? Or if this is this true, give an explanation as to why. The explanations themselves are not very much writing, but they are more technical. But to get to [the] point [that we are writing explanations] we are doing lab reports, which answer these questions and give us data and insight into the phenomenon to write an explanation about. Lab reports are structured – we write up in that format because that makes it easier to interpret the data and results. We also did this in chemistry and did a fair amount of writing in that class. But, writing in chemistry is different as well – you have use specific kinds of language and nomenclature in chemistry to explain reactions or explain phenomenon at a molecular level...One that comes to mind is, we got a question on three molecules and you have to explain why the boiling points are at different levels. In terms of interlocator forces, and in terms of molecules...So that is mostly the writing in those [science classes]. Lab reports, short answers, explanations. I type the reports, and they are fairly formal but it isn't the same as an essay. It isn't intended to be perfect it is more about the correct data and the right analysis in those reports, like how a scientist might document information and use it (Andrew, interview, 2).

In this excerpt, Andrew elaborated on his insights that writing, reading, and text use are different within and across natural science domains. Andrew is able to articulate the difference between approaches in physics and chemistry. Andrew described how in physics the students are often investigating the nature of forces, asking questions “why this is true?” and often resulting from a lab-based investigation or demonstration. In chemistry, Andrew described how the intention is to describe a reaction at a molecular level using “specific kinds of language and nomenclature” to illustrate the reaction (e.g., Shanahan, Shanahan, & Misischia, 2011). His description highlights the developing disciplinary distinctions he is making among the various kinds of writing, even within different scientific domains—chemistry and physics. Andrew describes that writing an explanation comes from the data the students collected in their lab; the writing results from the activities and engagement in the scientific practices and drives the purpose and production of this writing (e.g., Pearson, Moje, and Greenleaf, 2010). Without extensive experiences of lab engagement, lab reports, writing, reading, and inquiring about scientific phenomena

across domains of science, nuanced understanding about scientific domains and their similarities and differences are likely rare outcomes of high school learning.

In a third and final example about the use of texts and tasks, Shyloh described a research project they¹⁰ did for an English research project that encouraged the investigation of sources to construct an argument about more equitable health care for gender and sexual minorities. In this section, I analyze how Shyloh considered this learning opportunity and the disciplinary learning they used and gained from this experience.

Shyloh explained:

We were supposed to use a lot of academic journal articles...I ended up using Google Scholar after thinking about what database might work best and found some journal articles. I knew Google Scholar could give me articles from across topics and different fields of study. I'd read the book earlier, so I kind of knew what issues to look up because of their experience. Then I used Google Scholar to look up academic journal articles because the book that I read was not particularly academic. It was more narrative...I wanted to back up claims and some stories and with statistics and other experts' opinions about the topic of trans people's health care and the importance of equity and awareness. (Shyloh, interview, 1)

Shyloh explained that they had read a more narrative style text earlier as a part of the English course, and the task asked them to write an argument to be used with a public audience, supported by data and evidence, about changes that needed to happen in health policy to provide more equitable health care. Shyloh was charged with writing an argument for the policy changes needed and also was asked to share these results with a local health organization and hospital. This involved Shyloh curating the materials, reading, processing, and then formulating this into both a written and oral argument to be read and heard by the public.

¹⁰ As a reminder, Shyloh's preferred pronouns are they/them/their.

This task integrated skills, texts, and approaches in writing and production from across various domains, but at the core of the activity was the inquiry cycle and construction of argument around a large problem frame, called disciplinary engagement (Moje, 2015). This construction required understanding of the language variation and use across context, which Moje (2015) called *examining and evaluating* language. For example, Shyloh recognized that narrative stories alone are not always convincing for a general public as they may be seen as idiosyncratic or unique. Instead, Shyloh wanted to use the narrative story as a way to supplement the statistics that Shyloh knew to be prevalent in gender and sexual minorities' health care. Shyloh used an online database to curate and select scholarly articles across domains on topics that would extend the narrative text read in English class. Shyloh's approach was to integrate the statistics, expert opinions, and narrative stories to weave an argument about policy changes. Ultimately, Shyloh's teacher urged them to think of this for a public audience – Shyloh presented this work at school, and then after speaking at school, Shyloh was asked to present this to a local health care provider organization and hospital system.

The disciplinary tasks and use of multiple, complex, and disciplinary texts described above illustrated the learning experiences that Pine Ridge School valued. The students used and developed disciplinary literacy skills within and across domains as a result of these engagements and they spoke with knowledge and confidence about how disciplines read, write, communicate, and construct knowledge. As encouraged by standards-based documents and research, students engaged with multiple and complex disciplinary texts across domains and in the service of inquiry, or large problem frames (e.g., Moje, 2015; RAND Reading Study Group, 2002). This engagement allowed for students to examine and

evaluate the specialized language used across contexts and domains, as these three students' excerpts described. Without regular and routine disciplinary inquiry and developing of disciplinary literacy skills, students likely would not describe learning opportunities in these ways.

In the next section, I describe another finding from student descriptions of learning in Pine Ridge which was the opportunity for choice within learning and the development of agency as a result of how students were positioned as included and capable of this disciplinary learning.

Students' opportunities for choice and development of agency. In the analysis of the disciplinary tasks, texts, and assignments, I found that students were regularly asked as a part of their core academic learning to explore, construct, choose, curate, engage, and investigate knowledge in disciplines and domains within the classroom (and sometimes in a larger, external sense) community. Rarely were the students positioned or asked to be "recipients" of knowledge in the disciplines. The examples of tasks, texts, and literacy skills illustrate this finding to an extent; however, the approaches by teachers, the ways students were guided and supported in their choices of projects and disciplinary learning and offered agency as novice apprentices—what Lave and Wenger (1991) called newcomers—within and across disciplines. With allowing flexibility and choice within disciplinary inquiry (i.e., students could select texts, topics, foci) students were positioned as agentic within the context of the classroom and the discipline (Moje & Lewis, 2007). Students were budding novices in the disciplines who, aided by appropriate supports and apprenticeship as learning and apprenticing alongside their teachers, were able to construct knowledge and develop insight using disciplinary inquiry across domains. In what follows, I provide a

few representative examples of how choice, disciplinary apprenticeship, and agency manifested in the eleven students' learning experiences across domains.

During several interviews, in describing the tasks and texts of some of their courses, the students frequently highlighted and provided descriptions about projects that allowed for choice, which provided opportunities for agency and being positioned as novice apprentices in the disciplines (Lave & Wenger, 1991). All eleven students described in some way the aspect of choice in their learning. For example, Cassie explained that for some assignments you can “choose the outside texts that you want to read,” and Erin said that “for a lot of project we have freedom to choose a topic and pursue it” (Cassie, interview, 1; Erin, interview, 2). Michelle explained that teachers at Pine Ridge School wanted “learning and writing to be personal to us” and Jane said, many projects could be about things that “matters to us” (Michelle, interview 1; Jane, interview, 1). When there was not choice on projects and papers, students often lamented that the projects were “boring,” “restrictive,” and “irrelevant to me” (Shyloh, interview, 1; Michelle, interview, 2; Cassie, interview, 1).

One such example of choice and agency to pursue a disciplinary question came from an interview with Cassie who described the sociology project she engaged in after reading several sociological texts, sociological studies, and discussing several aspects of social phenomena this discipline investigates. Cassie explained that students were asked to design a small-scale study that collected data from people at school or some other group of their choosing. She indicated that you could work in groups or alone depending on what worked for you and interest in your question or topic. She explained:

in sociology, we wrote essays and did projects about bigger picture things like class structures, age, race....it corresponds with the big 'why' questions of the world and about society...I thought I had a lot of freedom about what I wrote about and the projects I investigated. Specifically, we designed a study, and had to create a research proposal, construct research questions, research sociological literature, design a study, and then we collected data. I wrote a paper describing what I found about how people rate attractiveness and intelligence. I had to really think about how to collect data about this topic and how to report it. I was able to choose the topic so I was interested and motivated in it. (Cassie, interview, 1)

For Cassie in sociology, she learned about the practices of the domain by engaging in the work of the discipline, with appropriate supports and tools through the process. Cassie also engaged in different stages of research design and learned about how a research project develops and is enacted in sociology. At times, educators might interpret choice and freedom as complete independence or complete personal exploration devoid of learning in a particular domain. This can often look like reflections, diaries, or personal feelings about reading and writing, which may be helpful in some cases, but not necessarily helpful in advancing literacy practices within a domain. However, this example highlights that choice was bounded within a framework of inquiry specific to the domain in which the students are studying. Choice and freedom was a way to allow students to pursue something that mattered to them, but also to develop experiences about the kind of questions, analyses, problems a disciplinarian might pursue.

Students were encouraged to develop arguments and engage in inquiry across domains. In the same interview, Cassie compared her sociology project to the engagement she experienced in English: "we definitely have had these kinds of projects in English – we have different kinds of writing but what is always true is that you can....interpret it in your own ways, and maybe you choose to interpret specific moments in the text, or film, or painting in your own way. I really like being able to create my own argument" (Cassie,

interview, 1). Similarly, in English, Michelle described her reading, discussing, and thinking in English that allowed for different perspectives and developing thoughts about texts:

And we are encouraged think about those different perspectives that the teachers brought up, but were are also encouraged to think about them and to be proud of how we are specifically reading the text and draw it to a specific theme that we are getting, and not to just read it to connect it to specific prompt, we can read it and write about the theme that we noticed ourselves. We just read the *Great Gatsby* in English class and some kids read it and saw the theme of homosexuality, but I didn't, I didn't read it that way, but it isn't wrong,...our teacher specifically said, that isn't wrong, a lot of other people have read it that way and there is a ton of scholarly evidence of it being that way and that is a good reading, and other readers paid attention to this with the theme of religion and there is a lot of evidence that this is a story based on god and none of that is wrong, and so when we wrote an essay on it these were all taken into account and they were all different instead of having it be like, I read this and it related to religion. And then it is like, no, we are trying to connect it to this one theme. (Michelle, interview, 2)

Michelle described the ways students were taught and encouraged to be “proud of how we are specifically reading the text...not just read to connect it to a specific prompt...we can read it and write about the theme that we noticed ourselves.” Here, Michelle pointed out that prompts can be limiting and even, at times, feel artificial to students. Michelle described how students were positioned alongside experts in their reading – “there is a ton of scholarly evidence of it being that way” – which signals to students that their reading and interpretation of text also matters. From Michelle’s perspective, an appropriate problem frame that encourages exploration and engagement of students to read for meaning and to “write about the theme that [they] noticed themselves” allowed students agency within the domain to think, read, and write about their own perspectives.

Choice and agency in their learning was found in some small ways, like the interpretation of specific moments in a novel of text, and in some larger moments, like the culminating class projects as in sociology. The constant thread through the learning

experiences was the ability for students to engage in the interpretation, reading, constructing and producing knowledge in the disciplines. Ryan expressed this in one interview by saying, “in (high school) in a lot of subject areas, you pick things. I like the hands-on learning and doing the work. Like not just learning the statistics, but trying to carry out a statistical analysis. Not just knowing about rhetorical devices but analyzing them and arguing why an author might use them. You can put your own personal spin on something, even if millions of other people have read it, your perspective is original. It is important to be doing the work” (Ryan, interview, 1). In this sense, “doing the work” seemed to position students as disciplinary “newcomers” and novices learning in an apprenticeship within a community.

Teachers as apprenticing students into disciplines. As described in the literature review, a community of practice, is comprised of “newcomers” and “oldtimers” in a socially and culturally constructed context seeking to apprentice into practices relevant to the domain (Lave & Wenger, 1991). Lave and Wenger (1991) explicitly noted that this theory and construct was not meant as a pedagogical approach or as a hidden identification of teacher/expert or student/novice. However, in a community of practice, a practitioner with experience and skill (oldtimer), supports through “legitimate peripheral participation” the engagement of newcomers into the social and cultural context and practices of the domain. Rounds of data analysis of artifacts, teacher interview, and students’ interviews revealed how teachers and students conceived of classrooms as disciplinary communities of practice engaging in apprenticeship. Faculty members at Pine Ridge School saw themselves as part of the disciplines and domains in which they taught. As a result, I argue, the teachers

designed supported disciplinary learning experiences for the students to engage in alongside the teacher – a disciplinarian – in an apprenticeship model.

One pattern across departments and the vision and philosophy statements about the school was the notion that faculty in these departments are unquestionably and unequivocally members of the disciplines in which they teach. This signals something critically important about the philosophy of teaching and learning, and the way students were positioned in and across these disciplines and domains. In other words, by positioning themselves as disciplinary insiders, teachers were structuring learning activities and experiences, in essence, to apprentice students; the disciplines were not something students were learning *about*, but rather learning *within* the disciplines with the teacher as the guide, as the facilitator, or as Vygotsky explained, “the more knowledgeable other” (MKO) (Vygotsky, 1978). The learning that happened within these domains alongside the MKO was not punitive or judgmental, but rather supportive and as a practice that required problem-solving and skill development. These sentiments and philosophies put forth by the school and the teachers were also echoed during students in interviews and through the artifact analysis from classroom learning experiences and inquiry. In what follows, I present two representative data exemplars that are representative of what I observed and documented about how the school thought about disciplinary learning, about apprenticing students into domains, and how students are supported and scaffolded to engage in disciplinary literacy learning.

Mathematics. During an interview with the department chair of the mathematics department, Ms. Martin explained the faculty in the department were “both mathematicians and educators” (Ms. Martin, interview). The department chair explained

how important it is for teachers to model the work to students and always change mathematical problems – struggle with problem solving and modeling alongside the students. Further, the department chair argued that “if you [as the teacher] are not *doing* the problems because you did them four or five years ago, and they are still in your notebook, and you don’t really think about engaging with them again, you aren’t *doing* the mathematics” (Ms. Martin, interview, 1). Then she described that “there’s an argument to be made that the best class you ever teach is the first time you teach it because you are standing at the board going ‘Well, I don’t know! What do you guys think?’...and actually letting it be that kind of space. Because that is what mathematics is...and you can show that to the students” (Ms. Martin, interview, 1).

Mathematics courses can be plagued with tracking, formulaic solving of problems, and rote learning (Ball, 1994; Boaler, 2002, 1998; Mayer, 2001). However, in this mathematics department, exploration and even failure around problem solving was paramount. As a part of a description of their courses, one mathematics faculty member explained that “math at [Pine Ridge School] should be encouraging of exploration above all. Students should want to try to solve puzzles and be comfortable with struggle. Math literacy should be something expected of our students and they should know why we believe that: people that can think critically, understand data and demand logically sound arguments are essential to society.” Ms. Martin echoed this sentiment by explaining “math is...math is a loser’s game. It’s like baseball. You hit .300, and you are striking out 70% of the time – and you are really, really good at baseball. Like, nobody hits .400 and that is [striking out] 60% of the time. It is an environment that we have to create that ‘striking out’ and still getting back into problem solving is part of it. ‘Striking out’ doesn’t mean you

aren't a part of mathematics, it actually means that you are" (Ms. Martin, interview, 1). This discussion about mathematics and what it means to "do the work" of mathematics showed the visions of learning these teachers possess when they teach. Further, Ms. Martin described that the department thought deeply about the why and the how of math learning; "we ask why are we doing this, what is the purpose and deeper question we are asking so we advance about math learning? We don't just do chapter four, sect three because we did chapter four, section two yesterday" (Ms. Martin, interview).

Science. In their science courses, students engaged with teachers who again positioned themselves as members of the disciplines in which they teach. In their department vision statement, the science department explained:

Our [Pine Ridge School] science faculty members are outstanding educators and scientists. Each of us is well trained and educated in the various disciplines in which we teach.

Faculty members in science viewed themselves as "scientists and as educators." In science, the department chair, Mr. Atkins, described that part of learning in the sciences meant engaging using practices of these domains. He shared conversations that the department had about the purpose and approaches to teaching. Ultimately, he shared their philosophy and approach across science classes:

It has to be hands on. And so we're going to do a lot of labs. What that means is that a lot of times...the discussions we have as a department or between science teachers is "Well, I want the students to learn this." "Ok, and how are they going to learn that?" They could learn it from reading, and notes, and stuff like that, or worksheets. But, I try to do labs to teach them this because then it isn't memorizing, it is learning practices, techniques, and approaches in science. We all try to do this in science classes. (Mr. Atkins, interview)

The department chair showed that learning *about* a domain could happen from taking notes from lecture, books, and worksheets. In this context, however, teachers wanted students to engage (not just learn about them) in scientific practices, experimentation, modeling, and problem-solving to approach overarching questions. In providing an example from his own teaching, Mr. Atkins explained:

...That is like the titration lab. It taught them how, what, what do you learn from a titration? There's some things you learn about different, different ways that you do the titration, different pieces of information... So now as they think about titration and this approach or if they have to "Describe a titration" ...now they've had that experience and the students can see why you did it. It's an important process. You know, the technique, and the things you go through. I design it this way because I want them to see, actually see the chemical things happening. (Mr. Atkins, interview)

Mr. Atkins continued to explain that this approach is not only to illustrate the scientific phenomena that the students already learned about, but rather an experience even before they know the details of names of phenomena. He said:

The [phenomena] that they are observing and thinking about it in a lab setting, they do that before we talk about it in class...then they can develop their own understanding based on experience...you are observing it, and then you are developing an explanation, and a model to explain it. So for example, from the 11th grade classes, sometimes labs are asking them to observe what is happening at the particle, at the atomic level, even before they know a chemistry concept.

Mr. Atkins emphasized that this was not just something that happened at the upper high school level, but rather, "That is something we consistently do across all classes in the department. It starts in middle school in the [inquiry-based curriculum] and continues throughout all science classes. This is our approach to learning science" (Mr. Atkins, interview, 1).

The representative examples from mathematics and science indicated that teachers across domains viewed themselves as disciplinarians within the domains that they teach. As disciplinary “oldtimers” and insiders, or as full participants in the domains, teachers were able to apprentice newcomers into the practices of the domain within the classrooms’ community of practice. Students were legitimate peripheral participants, meaning students were not *fully* engaging in the cultural and social context of science; but, rather, students were supported by disciplinarians through experiences to develop skills and practices relevant to the larger community of learners and practitioners. Teachers indicated that they saw themselves as apprenticing students into the domains and structured learning experiences intentionally around these goals.

In the next section, I explore the ways that teachers supported students to engage in disciplinary inquiry as apprentices using disciplinary tools, supports, and scaffolds to aid in the develop of disciplinary practices and processes among their students.

Tools, supports, and scaffolds used for *engineering* disciplinary literacy learning

Students are not yet disciplinarians or domain experts, and therefore, need support to engage in rich, text-based tasks. Teachers, knowing the goals of the inquiry and the practices that are required of the discipline, constructed intentional supports, tools, roles, activities, and guides for students to engage in this disciplinary learning and “apprenticeship.” Teachers developed these activities and supports as a way to engage students in the practices of the disciplines within the community of the classroom, but also with an eye toward the larger disciplinary community. These tools, supports, and scaffolds took various forms and are best illustrated and explored through examples of course

projects and guides. Disciplinary tools included guides for students' development of larger, extended projects, for writing and reading, and also included illustrations and models of disciplinary practices and literacies. Using two examples across domains, I illustrate the ways teachers supported students' disciplinary literacy learning within domain-focused inquiry. In rounds of analysis, I found many examples of supports, disciplinary tools, and scaffolds that allowed for students to engage in disciplinary and meaningful ways (and in more meaningful ways than would be possible independently). For sake of brevity and alignment with the previous section on apprenticeship, I present an example of scaffolding from science and math. As a final example, I provided an additional and representative example of disciplinary tools and scaffolds I observed in an English research project.

Chemistry: What would it take to get your school off “the grid?” In a chemistry investigation, students were asked “What would it take to get [Pine Ridge School] off the grid?” The larger question was then broken down into sub-questions that were possible to pursue in lab investigations, research, and other scientific procedures. Students were given time and resources to consider:

- How much energy is used by Pine Ridge School?
- To what degree can our school be sustainably powered by the chosen energy resource?
- How do we determine the **real** costs of various energy sources?
- What combination of energy resources would be “optimal” for powering our school? [“optimal” = providing the energy we need, when we need it, most cost effective, most sustainable, lowest environmental impact]

The teacher designed this to be a team activity with different roles within each group.

These roles meant that a person was responsible for leading some aspect of the sub-questions of the project. For example, a team consisted of 4 members: (1) energy manager,

(2) environmental engineer; (3) mechanical engineer; and, (4) public relations representative. Students were able to select roles and then supported each other in the endeavors of the project. For example, “the task of the Energy Manger is to determine the energy profile of the school and determine the ways in which the school could reduce its need,” and the public relations representative is responsible for “helping the energy manager in determining the school’s energy profile and the best language to explain this to the public. PR is also in charge of pulling together the final report” (“Off the grid” project guide). The two engineers worked together to “consider the environmental impact and cost of the energy produced to supply the school, and design and plan how to supply the school’s energy needs.” The culminating activity was a group panel presentation to present to the class for feedback and revisions, and then a final presentation to the Board of Trustees of the school. Students were provided with multiple assignments and supports throughout the unit to meet these goals. Over a month-long period, students worked together at various paces to investigate energy use, develop designs, labs, and other examples to gain insight to the larger question about energy use at their school. The students also drew on community resources of parents, local organizations, and outreach to learn about energy use and reduction efforts at the city, state, and regional levels. Students used scientific practices to investigate, model, report data, analyze, synthesize, and produce an argument to complicate the original problem put forth as a part of this project. The disciplinary tools and supports that the chemistry teacher provided included writing guides, team discussion prompts and design note-taking tools, supports for writing explanations and how to research for resources in scientific publications about various topics.

In essence, the chemistry example provided an opportunity to consider a large question of energy use within a context that is known and important to them. The teacher provided structures of tools to engage students in the disciplinary practices involved in this endeavor. The questions about energy use and energy cost involved lab skills and testing that occurred in previous lessons on these topics and were carried over into this extended inquiry and project. The learning path was flexible, but the structures in place made use of background knowledge, practices, and skills while still requiring students to develop even more skills and insights to answer this overarching question. The intention of this group project, according to the teacher, was to engage in a culminating learning experience at the end of a unit focused on energy, different types of energy, consumption, and reduction in use.

Evidence of disciplinary tools and aids included the guiding questions and line of inquiry of this project. The teacher developed pursuable questions for students to use inquiry to answer. This overarching problem frame situated the learning endeavor and organized the purpose of the activity and investigations. The roles of the project (engineering manager, PR manager, etc.) served as an organizing feature to support students to engage in a group in developmentally appropriate ways that served as approximations for how domain experts engage in problem solving and presentation of solutions and findings. The roles in this project also delineated the tasks in the groups and supported students to pursue questions in small groups or independently and then return to the group to collaborate and synthesize using data and other analysis. The project also asked students to think about the use of data and evidence and how to present these arguments to the public (or to a larger community). This provided purpose and audience

for these investigations and research. Additional disciplinary tools included the experimentation guides and labs used previously for investigating energy use and consumption. Students revisited these tools to engage in this project and replicated experiments to collect data for this projects' purpose. Additionally, students had engaged in generating explanations about energy use previously in labs and other projects in chemistry. In this context, explanations were once again needed to engage in this group project. Students used disciplinary guides for writing strong explanations for various audiences, in this instance multiple explanations, in order to formulate an argument.

Math: Calculus and "Beautiful Graphs." Another example in which I observed tools, supports, and scaffolds (called *engineering* by teachers in Moje, 2015) for disciplinary literacy learning was in the early weeks of a calculus course in 11th grade. The tools that students had available were largely those developed as a part of pre-calculus learning the previous year. For example, students had not yet learned how to take the derivative of functions, but instead had individual problem-solving tools that "added up" in less elegant ways to taking a derivative of a function. The students engaged in an extended problem-solving activity with peers. In groups, students were given a packet called "Beautiful Graphs." The assignment encouraged students to use their "toolkit" to develop and graph the functions and consider the beauty and structure of mathematics. The assignment asked students to include "as least the following on each graph: y-intercepts & roots; vertical asymptotes; horizontal asymptotes; end behavior; the function's continuity/discontinuity; the domain and range of the function; and the chart the connects the function's behavior to the nature of its factors." Students used these directions and the request that "now that you

know how to use limits, you must justify your decisions about the graphs' end behavior, vertical asymptotes, and continuities using limits" (Beautiful graphs – part I, p. 1).

The first page of the packet had a chart that listed 12 aspects of graphical representations and information that governs the graph shape, size, slope, concavity, and more. The chart allowed for students to document their current thinking; it was structured as the abbreviated example shows in Figure 4.4.

Figure 4.4: Abbreviated example of notetaking guide in math project

	WHAT IT IS	HOW YOU FIND IT
NATURE OF THE CURVE		
RELATIVE EXTREMA		
POINTS OF INFLECTION		
Y-INTERCEPT OF A RATIONAL FUNCTION		

The chart continued with 12 aspects and components necessary to graph the functions. The aspects on the note page included “nature of the curve, relative extrema, concavity of the curve, points of inflection, root of a rational function, y-intercept of a rational function, horizontal asymptote, vertical asymptote, removable discontinuity, chart to evaluate the nature of a Rational, Domain of a Rational, and Range of a Rational” (Beautiful Graphs – part I, p. 2). The students filled in the chart to document their thinking and use these aspects to guide them through problem solving.

The next page introduced a function at the top of the page. See Figure 4.5 for Beautiful Graphs, Part I, page 3. The directions at the top included “consider the function” with a function listed and then several problem-solving stages that would develop and uncover information about the graphical representation that would ultimately result.

Figure 4.5: Beautiful Graphs – Part I, page 3

Consider the function $g(x) = \frac{x^2 + 4x - 5}{x - 2}$.

Use Synthetic division to show that $g(x) = x + 6 + \frac{7}{x - 2}$.

According to the Division Algorithm, $g(x) = q(x) + r(x)$, where $q(x)$ is the quotient and $r(x)$ is the remainder.

Identify $q(x)$:

Identify $r(x)$:

Complete the following chart:

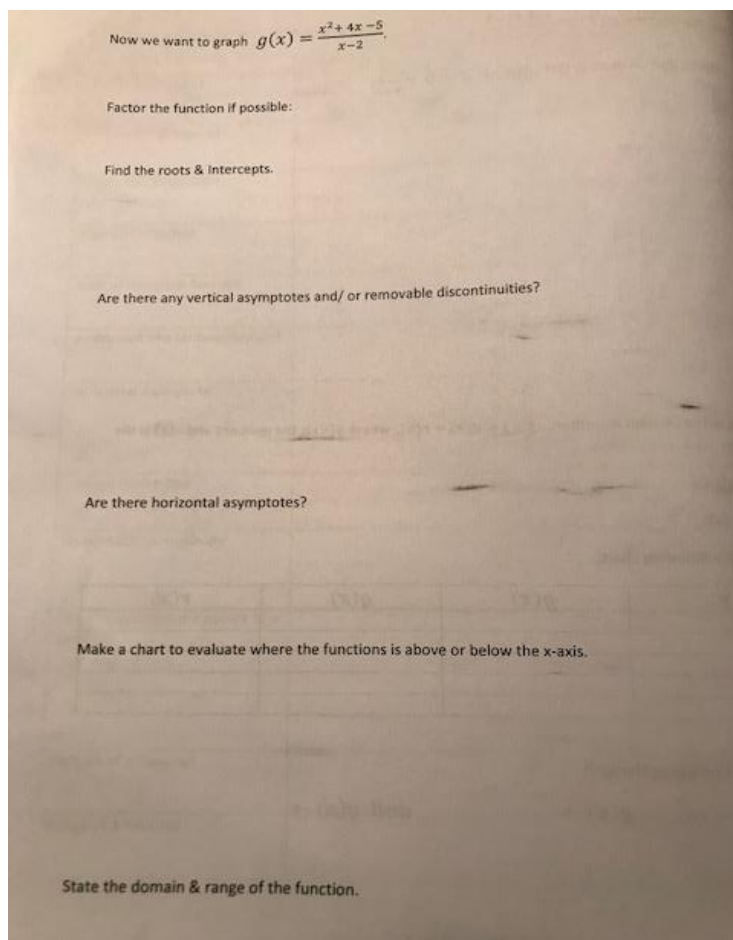
x	$g(x)$	$q(x)$	$r(x)$
5			
10			
50			
100			
1000			

Complete the following thought:

as $x \rightarrow \infty$, $g(x) \rightarrow$ and $q(x) \rightarrow$

This page scaffolded students to engage in a synthetic division (a faster way to complete polynomial division); students engage in documenting continuity and discontinuity using the chart provided and explanations of limits. The next page of the document, included below, supported students to graph the function using prompts that assisted in constructing an accurate and complete graph. See Figure 4.6 for Beautiful Graphs, Part I, page 4.

Figure 4.6: Beautiful Graphs, Part I, page 4



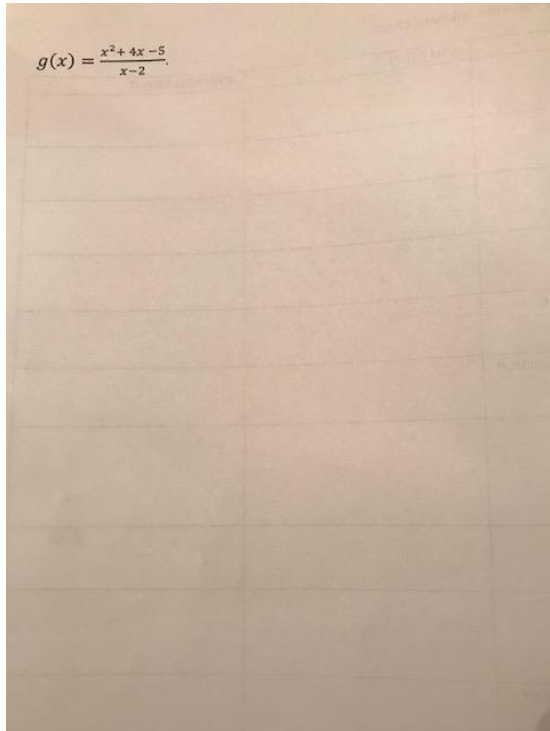
Students, with peers, considered the steps and engaged in this extended problem solving. Noticeable scaffolding and literacy tools in this example are the prompts, structures, and guides provided to students as they considered the approaches to graphing these functions. Further, as was mentioned earlier, students were at an early stage of their Calculus course and had “toolkit” developed mostly from knowledge in pre-calculus. In many ways this assignment was eliciting previous learning and background knowledge and bringing to the surface the knowledge these students had to engage in this work with the tools they had available. Part I of Beautiful Graphs, as it described here, is a 10-page packet with

notetaking tools, prior knowledge documentation, graphing, room for problem-solving and explanations. However, weeks later, students engaged in “Beautiful Graphs – Part II” after learning occurred in their calculus course regarding new tools and approaches to graphing functions, students revisited the same functions and graphs with new slightly new directions and the removal of some scaffolds.

The first cover page, page 1 of Beautiful Graphs Part II included new additions to the directions. The directions were the same, except the new addition of “you must include the following on each graph: [all 6 directions from Part I included], and Critical points, points of inflections, relative and absolute extrema, with calculus-based analytic justifications. Also, a description of the graph (increasing or decreasing, concavity, unusual features)” (“Beautiful Graphs – Part II, p. 1). Again, the note page stayed the same on page 2, except students had the new additions to document their calculus-based learning and definitions. The chart now included at the bottom, “domain of a function and range of a function” instead of “range and domain of a rational” (Beautiful Graphs – Part II, p. 2). The new directions marked the learning and engagement that happened between work on this project.

The next page of the Part II packet looked like the page below, with a blank graph on the page the followed. See Figure 4.7.

Figure 4.7: Beautiful Graphs – Part II, p. 3-4

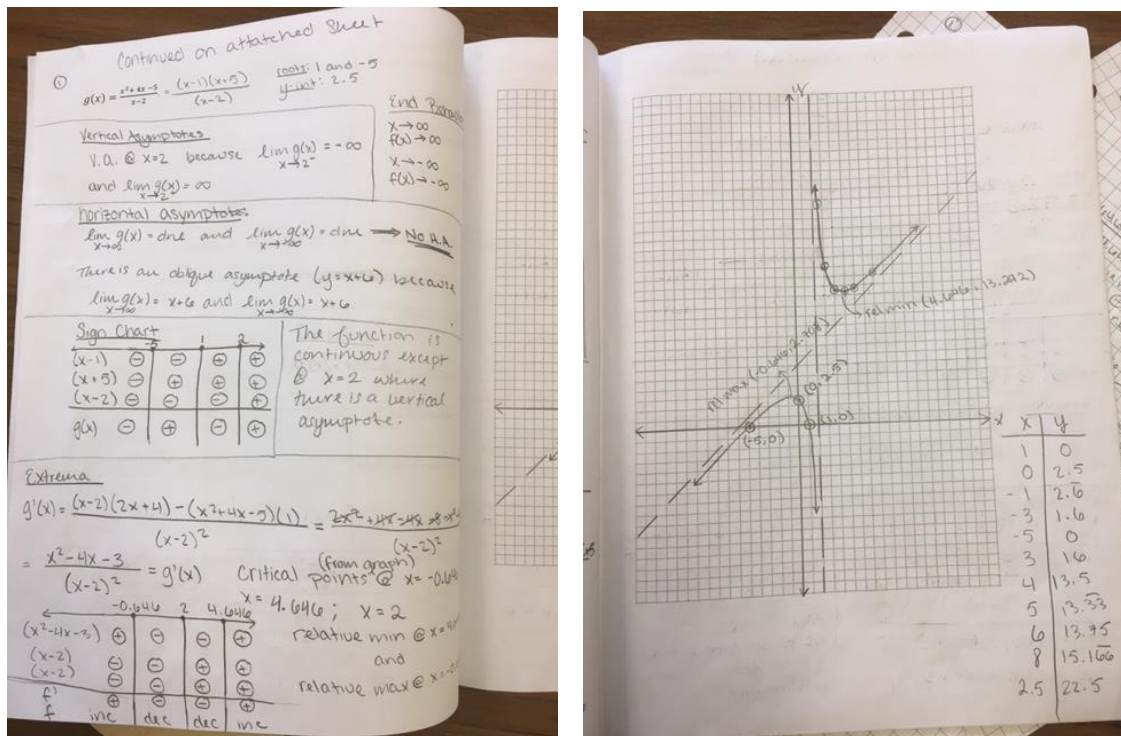


The function on the page was the exact function the students had engaged with weeks earlier, using the limited tools available to them from pre-calculus. Since that original learning, students had developed new skills and problem-solving techniques like derivatives and learned about describing the nature of graphs in different ways. As Ms. Martin explained, as she looked at the project, “the part I of the Beautiful Graphs assignment is a lot like a beginning driver taking side roads and thinking, ‘this is great. I am driving.’ Then, when students get to calculus, they can take a highway. Without going through both you wouldn’t have an appreciation of the tools of calculus and the power of derivatives and other techniques of calculus.” The students were supported to engage in extended problem-solving using many practices and skills of mathematics. More important, the project was scaffolded for their engagement. The project honored the skills of students

as they entered calculus and did not wait for them to gain more skills before they engaged in extended problem-solving; they did it from the start. The project illustrated the ways students might be scaffolded to do disciplinary work throughout a course and return to material as a way of reflecting on learning and knowledge development.

A student shared an example of this work from class. On the blank sheet of paper with only a function, students (working in teams) developed approaches and structures to go through investigations about this function and its graph. As evidenced by the structure, approaches, organization, and information provided, there was undoubtedly an enormous amount of scaffolding that happened through active instruction between part I and part II of this activity.

Figure 4.8: Example of Student Work on Beautiful Graphs – Part II



As the student work example demonstrates, the “Beautiful Graphs” assignment scaffolded students to engage in representing functions using the toolkit the students possessed at the start of the class, and then revisited the same function with a new set of tools, but now with less scaffolding. The tasks increased in sophistication just as students gained more knowledge and skill.

In a final example, I present the disciplinary tools and scaffolds that I observed as a part of an English research project, which serves as a representative example of other disciplinary supports I saw teachers across domains provide to students.

English Research Project: Investigating and Constructing an Argument

This section presents artifacts from an extended research essay project and presentation as a part of the students’ eleventh grade English course. For this project, the teacher provided several supports that made visible the process and the language and literacy practices that students would use to engage in the process of research, writing, and presenting. The essay prompt explained it was “an argumentative research essay on a topic of your choosing. There must be a thesis statement and evidence from sources to back up your argument. The bulk of the essay will be your own explanations for the evidence and argumentative reasoning” (Assignment Sheet, p. 1). The teacher emphasized to the students that the final product of this essay will take shape through an extended process.

The teacher provided meaningful framing for students and worked with them individually to develop a focus, a problem or idea to investigate, and where to locate reliable sources; throughout the artifacts on this assignment including powerpoints, rubrics, graphic organizers, and others, the teacher re-iterated repeatedly that “the essay is driven by a problem” that students were investigating and analyzing.

Some of the artifacts that I observed that served as supports included: (a) a detailed schedule for researching, analyzing, and then writing; (b) outline of approaches for engaging in what the course (and all of Pine Ridge School) called “process work” which is ultimately a graded component of this research essay; (c) a short essay by Anne Lamott that described the process that professional writers engage in during writing, rewriting, and editing; and, (d) a detailed rubric that described the components that make a strong researched argument and essay.

The process work of these essays was integrated into aspects of class and modeled for students. A first example was the curation and process of finding sources for the research essay. Students were provided some instruction in the library, but also provided descriptions of academic journals, news outlets, books (organized by topic), and other publications, each with descriptions of how the source(s) might be helpful to researching their particular problem space. A second example of process work was the modeling (by the teacher) and then construction (by the students) of concept maps, which mapped their arguments in specific ways. New connections, revisions, new “branches” were constructed on the maps as new evidence and argument structures emerged.

Though it would be too detailed and nuanced to elaborate here, the teacher also spent substantial time engaging in class discussions about what plagiarism actually is; she recognized that students entering college are often scolded and repeatedly told NOT to plagiarize. But, do they know what this offense entails? The teacher provided them a multiple page document with exercises that allowed students to attempt paraphrasing and attribution and provided opportunities for students to discuss those “gray issues” about what constitutes plagiarism. Students discussed ways that plagiarism could be recognized

and avoided and dedicated time and discussion to a complicated and often overlooked issue in research writing.

As they were engaging in writing and revising, the students read Anne Lamott's essay about professional writing, a witty and brief description of the process good writers go through as they write and revise. Reading this article seemed to serve two purposes. Lamott described and labeled different draft types, which included three stages: first get words and writing on the page, the second that fills in gaps, checks logic structure, and refines ideas, and the last that is the most detailed copyediting approach to writing. The students used the language of these drafts in their own writing and these drafts became collaborative artifacts for students and the teacher to engage in discussing and refining writing. Reading Lamott's essay also implicitly positioned students as good and capable writers who should take this kind of care with their own writing in the ways professionals writers also do.

Lastly, the teacher provided the students a detailed rubric that served as a description of the strong components of research-based argumentative writing. The rubric was provided at the start of the writing endeavor to provide the language and components of a strong analytical essay. Because the course spent significant time discussing ethos, pathos, and logos in written and spoken arguments, this also became part of the grading rubric on recognizing their own argumentative structure in writing. Figure 4.9 below provides a small snapshot of a portion of the rubric of this essay.

Figure 4.9: Excerpt from English Research Essay Rubric

The Argument:	
_____	: Includes a strong, argumentative thesis that expresses both WHAT the student is arguing and WHY that argument is significant (LOGOS).
_____	: The organizational structure of the essay is logical and shows awareness of how the argument progresses from beginning to end. The topic sentences contribute to the structure of the argument. There are smooth transitions between different sections of the essay (LOGOS).
_____	: The writer uses appropriate, thoughtful, and compelling evidence with enough reasoning provided to show how the evidence contributes to the persuasiveness of the essay. The type of evidence used is appropriate for the context/occasion/purpose (LOGOS).
_____	: The writer is very careful about whether she uses pathos and, if so, about how she deploys pathos as a strategy—she avoids becoming overly sentimental, cloying, or “cheesy,” which could undermine the ethos. The use of pathos is thoughtful and logical (relates to the logos of the essay); for a persuasive research essay, pathos is usually most effective in the introduction or conclusion. The writer has considered how context/occasion/purpose influence the use of pathos in the essay (PATHOS).

As the examples from the rubric in Figure 4.9 communicated, a strong research-based essay would include (the first rubric component) a strong argument, but also an argument about significance of this issue or problem. The rubric also made visible the disciplinary literacy skills and language that students would use in their writing, by labeling and describing the language and approaches to argumentation. Additionally, it provides reminders about using evidence and reasoning (e.g., “uses enough reasoning...to show how the evidence contributes to the persuasiveness of the essay,” and “pathos as a strategy” to avoid being too “sentimental” or “cheesy”). The rubric provided important indications of what the class and the teacher had spent time considering strong arguments and reminded students and provided support for them to enact this kind of writing in their own essay. Although the rubric served as a grading tool, it more importantly served as a model for

high-quality argumentative writing and as a tool for students to check and engage the refinement of their own writing.

Conclusions

Students' high school experience at Pine Ridge School was exceptional. But, it also provides a vision of the kind of educational to which all students should have access and educational opportunities being called from in K-12 reform documents. The eleven students in this study experienced disciplinary literacy learning across domains in high school. Students engaged in disciplinary inquiry tasks using multiple, complex, and disciplinary texts within and across domains. Students were routinely positioned as "newcomers" or novice apprentices within domains – this was achieved through providing choice and encouraging a sense of inclusion and agency within their disciplinary learning. However, students would not be able to access the texts and tasks required of these inquiries, nor develop these disciplinary dispositions without the disciplinary tools, scaffolds, and instruction provided by teachers. Teachers used disciplinary tools and scaffolds to apprentice students into the domain and support students' developing disciplinary literacy practices within their domains. These tools made visible the process and the approaches to disciplinary engagement in a domain. Underlying the high school experiences of these eleven students overall was a belief that student should be positioned to engage in disciplinary learning through academic inquiry and that students are capable of engaging in this learning with the supports of experts (often teachers) who construct tools and scaffolds for the students' disciplinary engagement.

CHAPTER V

College Disciplinary Learning and Literacy Experiences Over Two Years

In Chapter Four, I described the learning and literacy experiences that eleven young people had during their last two years of high school (and using their reflections, some of their earlier experiences in middle and early high school as well). For the eleven “college-ready” students, high school included opportunities to engage in disciplinary literacy learning and disciplinary inquiry.

By contrast, during these eleven young people’s first two years of college, students experienced a consistent pattern of learning and teaching dominated by exam-based forms of assessment with limited opportunities to engage deeply in disciplinary literacy learning experiences across the majority of their courses. Although these eleven, “college ready” students brought with them a host of reading, writing, thinking, and other disciplinary literacy skills from high school, college courses did not “take up” the disciplinary literacy skills and practices where the students were. The eleven young people in this study were *ready* for more than what was the central and most dominant focus in college. In those courses that included some opportunities for other experiences and assessments, there was still enormous emphasis on the traditional notions of assessment and knowledge in the final calculation of the grade – the ultimate currency and indication of knowledge gained in college courses and in college more generally.

Further, and most important, when professors and courses did engage students in disciplinary tasks and assessments outside of exams, the students had two dominant

experiences. The first was confusion and difficulty as a result of the lack of scaffolding, support, or explicit instruction on the disciplinary practices that would allow students to engage in these tasks in meaningful ways. The second dominant experience was that of boredom as a result of mundane tasks, repetition from high school, or prescriptive activities that allowed for no exploration of interest or use of disciplinary inquiry. Tasks at both ends of the spectrum kept disciplinary practices and approaches tacit and implicit to students and in some ways required students to navigate these tasks independently. When observed, disconfirming cases are presented to show how learning experiences and teaching operated differently than the dominant patterns noticed among most courses and learning opportunities.

In this chapter, I present the courses, academic tasks, and texts that these same eleven young people encountered over their first two years of college. Through rounds of data analysis, I found a recurrent and dominant pattern among the academic and literacy-based learning experiences of college: students overwhelmingly engaged in insufficient and didactic forms of academic work across their coursework. Upon closer analysis of students' experiences within their major areas of natural sciences and social sciences, this looked like students frequently taking test and exam-based assessments and as a result less often opportunities for other assessments or tasks in their courses. Lecture was the primary mode, and at times the exclusive mode, of instruction across courses and throughout individual courses. Exams often involved textbook reading and memorization. This meant that students experienced disciplinary literacy learning opportunities only rarely. When disciplinary literacy opportunities were encountered, the literacy experiences were largely unscaffolded, unsupported, lacked disciplinary tools, or lacked awareness of students'

previous skills, or conversely, were highly prescriptive. None of these approaches allowed for meaningful student engagement or inquiry and rather resulted in feelings of confusion, exclusion, irrelevance, and boredom. College was more about “doing school” instead of “doing the practices and work of the disciplines.”

Because the students in this study attended seven different higher education institutions and because each took a variety of courses, I documented and analyzed experiences that students were having both within and across courses, as well as analyzed trends across institutions. To do this, I analyzed artifacts and documents from students’ courses (i.e., syllabi, readings, and assignments) alongside their interviews, questionnaires, and daily check-ins across semesters. In what follows, I present the findings from the Constant Comparative Analysis (CCA) (Glaser & Strauss, 1967) that closely examined the trends within and across courses and institutions.

This chapter is organized into three main sections. The first section focuses on students’ courses in college within and across domains and presents patterns and trends among all eleven students’ courses over two years. In the second section, I present case studies focused on the disciplinary learning and literacy experiences among natural science majors in their major area course work. And, in the third and final section, I present a case about social science majors and their literacy and learning experiences across social science coursework.

In the next sections, I outlined the courses that students took, the texts and tasks associated with the courses, and the ways that the disciplines were presented to the students. Main findings of in this chapter are also displayed on the Key Linkage chart displayed at the beginning of Chapter IV. See Figure 4.1.

Patterns Among Students' Courses in College Within and Across Domains

Over the first two years of college, the eleven students in this study took a total of 182 courses. Table 5.1 details the courses and overall totals included in this analysis. The blue shaded columns represent the number of courses and types/disciplinary areas of courses taken by natural science majors, the yellow shaded columns represent the social science majors, and the green shaded columns represent the students who had alternative paths during their time in college (e.g., dropping out, changing institutions, taking time off, entered a career). Each of these groupings represent a case study that will be a part of this dissertation. In this chapter, the cases of natural science and social science majors will be presented. In Chapter VI, the three students included in the alternative path case study will be presented as a way to understand students' navigation of college environments. To provide more details regarding course classifications, I have provided a brief list of the types of courses that comprised each of these categories:

- Social sciences: sociology, history, psychology, art history, law, politics, comparative government, business, economics, social theory, journalism, research design in social sciences, education, anthropology, ethics.
- Natural sciences: physics, chemistry, biology, engineering, anatomy, physiology, neuroscience, neuropsychology, astronomy, environmental science.
- Mathematics: calculus, statistics, game theory, accounting, business math
- World languages: Chinese, German, Latin, Spanish, French, and other world languages.
- Humanities: music, philosophy, mythology, courses called 'humanities'
- English: creative writing, composition, first year writing, literature courses, linguistics, and film (due to teaching approach)
- Other: ROTC courses (naval sciences, leadership, ethics), Resident Advisor training courses.

Table 5.1: Participants' Courses During First Two Years of College

	Total number	Wyatt	Jessica	Andrew	Erin	Shyloh	Jane	Hope	Ryan	Cassie	Jennifer	Michelle
Social Sciences	65	5	0	3	8	11	10	12	9	3	1	3
Natural Sciences	49	7	13	13	4	3	2	1	1	0	3	2
Mathematics	21	1	3	6	1	1	2	3	3	1	0	0
World Languages	20	3	4	1	2	1	3	0	2	2	2	0
Humanities	11	0	0	1	2	1	1	1	2	2	0	1
English	7	0	0	0	0	0	0	2	0	2	3	0
Other	9	2	4	0	0	1	0	0	0	2	0	0
Total number of courses	182	18	24	24	17	18	18	19	17	12	9	6

As table 5.1 displays, students in this study took mostly social science (n=65) and natural science courses (n=49). The next most frequently taken courses were mathematics (n=21) and world languages (n=20). The bolded numbers in each column indicates the most frequently taken course type by student. All of the social science majors took at least one humanities course, as did Erin and Andrew among the natural science majors; in total seven of the students took a total of ten humanities courses. Because many of the students “tested out” or “placed out” of the first-year writing requirement, few of them had a requirement to take an English literature or other composition-style course. Some students chose to voluntarily take courses in English and writing. However, as the case studies that follow also highlight, Hope was the only student to take an English class of the 8 students who majored in natural sciences or social sciences. One writing intensive taken by Jessica was classified as a natural science course due to the course content and types of writing. This particular course is explored more in the natural science case study.

Table 5.2: Assessment Types Across Domains and Participants' Courses

	Final exams	Exams/ midterms	Quizzes	Home-work	Projects	Papers	Partic./ Attend.
Social Sciences (n=65)	20%	27%	6%	4%	8%	25%	10%
Natural Sciences (n=49)	28%	32%	6%	17%	8%	4%	5%
Mathematics (n=21)	32%	37%	3%	17%	5%	1%	5%
World languages (n=20)	13%	28%	16%	8%	6%	14%	15%
Humanities (n=11)	18%	16%	9%	4%	6%	36%	11%
English (n=7)	11%	6%	1%	12%	13%	50%	7%

Assessment Types Across Domains

Among the 182 courses that students took during the first two years of college, I found that the most common assessment type across all domains and courses was final and midterm exams and tests, with the exception of assessment types in English and humanities courses. Exams, when available, were analyzed as a part of this interpretation of disciplinary learning. The vast majority of exams were characterized by multiple choice responses and other short “objective” style questions. Table 5.2 describes the specific percentages of final grades attributed to various assessment approaches across the 182 total courses and then described by domain. The blue shaded boxes highlight the areas with the largest grade component on different assessment types across domains. Mathematics courses had the highest average of final grades as determined by exams with sixty-nine percent (69%), on average. In natural science courses, sixty percent (60%) of final grades were determined by exams, on average. Across social science courses, forty-seven percent (47%) of final grades were determined by exams.

Social science courses, on average, determined 25% of final grades from papers and paper writing. With the previously noted exception of English (50% paper component) and humanities (36% paper component), after averaging across courses, no other domain had a meaningful emphasis on paper writing or a written component as a part of the final grade calculations. There was a relative lack of writing in the natural sciences and mathematics, as papers constitute only four percent (4%) of final grades in natural sciences and one percent (1%) of final grades in mathematics. It is worth elaborating that within the category of paper writing, the coding for these components was generously defined; this category could include *any* writing that was graded in the class, from the most informal writing response on an online message board, to the most formal, research-based multiple revision paper. The details of these writing assignments will be explored in more detail in the natural science and social sciences case studies.

The noticeable exception to exams being the dominant assessment type and determiner of the final grade in a class was in English and humanities courses. Very few students took English courses; only three of the eleven students took English courses and, therefore, only these few students were the ones to experience the writing assessment in these courses. In humanities, the courses included an almost equal balance between exams (34%) and papers (36%) as determiners of final grades; a total of 8 students took courses in the humanities and therefore would have experienced these assessments. Students typically took one humanities course, so the kind of assessments that would have been experienced in these courses were not experienced by many students in this study. Had students taken more humanities courses and English courses, they may have experienced less testing and more opportunities for writing and projects.

Homework, the daily or periodic work from a course, was valued highly within the natural sciences and mathematics courses (each at 17%, on average), and not as highly valued as a part of the final grade within other domains. Often these were presented as problem sets that students engaged in outside of class and then turned in for grades. The nature of the homework across courses is presented in the natural sciences case study. Participation and attendance were slightly more a part of the final grades, on average, in the social sciences, world languages, humanities, and English than they were in natural sciences and mathematics. In some courses this participation score related purely to attendance in courses, but in other classes it related to the participation and discussion as a part of the course. The structure of the course – having participation as a feature or not – determined how this score was used. As was elaborated in the case studies, discussion-based courses were rare among the courses that students took.

A final pattern that emerged across assessment of course grades is the lack of emphasis on projects across all domains; the range of percentages of final grades determined by projects was from the highest at 8% in the social sciences and natural sciences to the lowest at 5% in mathematics. Projects referred to any intentionally constructed and extended opportunity for students to work alone or in a group on any task beyond individual paper writing. Projects sometimes took the form of presentations to accompany papers, constructing a business plan or another research-oriented task, or collaborating on a lab assignment and co-constructing a product (i.e., lab report, data, presentation, explanation) from the lab or activity. These experiences seemed rare across courses and across domains. The relative lack of projects and collaborative experiences is even more surprising considering the calls for more emphasis on creativity, collaboration,

critical thinking, and other important future intellectual and professional skills (HERI, 2015a, 2015b).

Courses that included or excluded papers and projects. It is important to note the way that averages can mask the individual courses' patterns and frequencies of assessment type. In other words, although the averages provide a sense of the larger picture across courses, it may be true that some courses had an even heavier weight of grades on exams, and other courses may have distributed assessments and grades across multiple categories, and less on exams. To analyze the courses within domains, I have removed the "other" category and the associated 9 courses from the data presentation as a part of table 5.3. The remainder of the courses, 173 in total, comprise these analyses. In considering the possibility of variation of grade distributions within courses, three patterns emerged across the 173 courses when patterns were considered within domains and what might have been included and excluded from some of the individual courses:

- (1) over forty percent (41%) of all courses lacked projects or paper writing in any form as a part of the determination of the final grade, and these courses exclusively used exams and quizzes for determining final grades;
- (2) more than sixty percent (61%) of the courses in natural sciences and more than three-quarters (76%) of the courses in mathematics did not have a project or paper writing component of any kind;
- (3) in the social sciences, nearly one-quarter (24%) did not include papers or projects of any kind. However, two-thirds of the classes did include papers, and much fewer included projects or collaboration (only 32% of courses included projects in social sciences);
- (4) the notable exception to these trends was the inclusion of papers and projects within English and humanities courses.

Table 5.3: Inclusion or Exclusion Papers and Projects Across Domains

	Did not include/excluded papers nor projects	Included projects	Included papers
All Courses (n=173)	70 of 173 (41%)	57 of 173 (33%)	76 of 173 (44%)
Social Sciences (n=65)	16 of 65 (24%)	21 of 65 (32%)	40 of 65 (61.5%)
Natural Sciences, including lab classes (n=49)	30 of 49 (61%)	13 of 49 (26.5%)	9 of 49 (18%)
Mathematics (n=21)	16 of 21 (76%)	5 of 21 (24%)	2 of 21 (9.5%)
World languages (n=20)	6 of 20 (30%)	10 of 20 (50%)	10 of 20 (50%)
Humanities (n=11)	2 of 11 (18%)	4 of 11 (36%)	9 of 11 (82%)
English (n=7)	0 of 7 (0%)	4 of 7 (57%)	6 of 7 (86%)

These three patterns indicate that a meaningful percentage—more than 40% —of all courses lacked diversity in assessed tasks without extended projects, collaborative work, or paper writing of any kind. Within the natural sciences and mathematics this percentage was even higher; students might experience an opportunity for writing or project-based work in less than one-quarter of their courses in math and natural science, and this statistic, included both lab-based and lecture-based courses. In the social sciences, courses that may be more commonly thought of as including writing, still one-quarter did not include a writing or project component. Although students took very few English and humanities courses, the trend was that papers were very often a part of the courses. In the humanities and English courses, I found similar structures, disciplinary tools, scaffolds, and supports to what was observed in the students’ high school writing experiences. Projects were observed to a slightly lesser degree in English and humanities courses, but still more often than in natural sciences, math, and social sciences. The courses organized as

discussions and interactive tended to have more supports and disciplinary tools provided for students. As one example, in an introductory seminar to humanities, Erin had descriptions of stages for developing a research essay. In another example, Jennifer had opportunities for drafting and revising for her essays in her English course. Had students taken more English and humanities courses, it may be that the trends among these statistics may be different.

The texts used across these courses also illustrated stark distinctions. Textbooks dominated all domains and disciplines in college. Of the 21 mathematics courses students took, 19 used a textbook as the primary (and largely exclusive text) in the course. Supplemental texts took the form of a coursepack with additional problems and previous exams used to prepare for course exams. World languages also almost exclusively used textbooks and these texts were used as workbooks to prepare for short quizzes and exams. As students progressed in World Languages courses, students read some texts from the language they were studying (although some proved redundant as in the case of Latin students who had spent extensive time reading Virgil's *Aeneid* in high school and it again became the only main supplemental text in their courses in college). English and humanities used textbooks in 8 of the 17 courses used textbooks as the primary text. I did find evidence of the courses using other texts, such as articles and books to supplement the reading, and as elaborated before, English and humanities were the courses that were more likely to include inquiry and disciplinary reading and writing as a part of their structures. As will be elaborated in the case studies, natural sciences and social sciences were also dominated by textbooks, but social science courses were more likely to make use of disciplinary texts. An important caveat is needed here. The texts across domains were

primarily textbooks and on occasion these course readings included other more disciplinary texts as a part of reading. However, if these texts were rarely or never used as a part of students work and engagement (other than to read and then hear what the professor lectures about in class), then there is no inquiry or problem frame around the texts themselves and no purpose for reading. In other words, so long as students were not asked to engage in anything but test-taking and attending lecture, at least not any other activities regularly, the texts (even disciplinary texts) may have been present, but not used as a part of engaging in disciplinary practices and inquiry in these courses.

Across almost all courses and domains, at least the large majority of their courses, college emphasized taking tests and exams and dedicated a large proportion—more than half and up to sixty percent—of final grades to these activities. Further, in their daily diaries in which students reported how they spent their time during weeks of their semester, 83 percent of the reports included indications that students were spending time studying for exams. These activities most often took the form of “reviewing lecture slides,” “reading my textbook for my exam,” “memorizing terms/vocabulary/terms,” or “doing practice problems for exam.” Especially within certain domains (math, natural science, social science), students had fewer opportunities to write, earn grades for participation and discussion, and engage in projects. I must ask, if taking exams, reading textbooks, and reviewing lecture slides are the activities that students do most, then what was being communicated to students about what it means to learn within and across these domains? To what extent do such practices reflect what members of these disciplines do on a daily basis, and how are these students apprenticing to the practices of the disciplines by engaging in test-taking?

In the next section, I present findings within two case studies to analyze the academic experiences of students within their chosen domain and major during their first two years of college; cases will closely analyze the most frequently taken courses among students' natural sciences and social sciences and more closely investigate the patterns that emerged within the courses taken with the most frequency among these students.

Case Studies of Students' Learning Experiences Within Domains

Statistics about courses and trends among assessments provide only part of the experience of students in these courses. Another layer of analysis provides more detailed accounts of what students experienced in their courses and as they engaged in the learning experiences of college. In analyzing these data, I again asked, what were these students ready for, and ultimately, what were they asked to do, and how were they supported to engage in these activities? To build these cases, I analyzed and drew on multiple data sources: semi-structured interviews with participants after each academic semester; artifacts, assignments, and syllabi from every course the young people took through their first two years of college; and, daily "check-ins" during midterms and finals periods to ask about the learning and work the young people engaged in "real time."

Cases of students' learning within their majors (natural sciences and social sciences) provide nuanced examples of the experiences within courses, across courses, and across institutions. In this section, I elaborate on two cases of college literacy learning and course experiences. The first case presented is about natural science majors disciplinary learning experiences within their major area coursework, and the second case presented is about social science majors' disciplinary learning experiences within their social science coursework. The two case studies presented in this chapter are comprised of eight

students, four in each case. In Chapter VI, I present a third case study that involves three students who took “alternative paths” in college (e.g., dropping out, transferring, entering careers) and whose experiences offer questions about what is meant by “readiness” and provide understanding about how students navigate college environments.

Natural Science Majors’ Literacy and Learning Experiences

Four of the students in this study were natural science majors’ and attended four different higher education institutions. As a reminder, Wyatt was pursuing a Cellular and Molecular Biology degree at a large, public university in the Midwest. Andrew was a student at an elite Science and Technology Institute pursuing a major in physics with a particular interest in astrophysics. Jessica, a student at an Ivy League school, was pursuing a Chemical Engineering degree with a concentration in Biotechnology and Pharmaceuticals, and a language certificate in Chinese. Erin was a student at a small, liberal arts college in the Midwest majoring in neuropsychology and taking several classes in neuroscience at the suggestion of her advisor to pursue a natural science emphasis.

In the natural sciences and among the natural science majors, I found that the domains of science communicated specific and narrow aspects of the domain to these students through the course structures, assessment patterns, and emphases of the courses. In regards to course structures, assessments, and language-based work, I found that natural science majors experienced three dominant patterns in their first two years of college:

- 1) Natural science courses were dominated by lecture as the primary and, in some instances, the exclusive method of teaching. Even in cases where structures existed for smaller group work or discussion, lectures still permeated these spaces;

- 2) Lab-based courses provided some limited opportunities for scientific practices, inquiry, and writing, but there were very few courses that were considered lab-based and not all of the lab courses regularly engaged in inquiry; and,
- 3) Natural science courses had limited diversity in assessment types and texts read. Exams dominated the grading and learning goals of the courses, supported by homework and problem sets that sought to prepare students for the exams in the courses.

Table 5.4 outlines the courses taken by natural science majors over the first two years of college.

Table 5.4: Natural Science Courses Taken by Natural Science Majors

	Lecture-based courses	Lab-based courses	Discussion-based courses/writing intensives
Wyatt	<ul style="list-style-type: none"> ○ Organic Chemistry I ○ Organic Chemistry II ○ Physics in Life Sciences ○ Genetics 	<ul style="list-style-type: none"> ○ Introduction to Biology Lab ○ Organic Chemistry II lab ○ Physics for Life Science Lab 	<ul style="list-style-type: none"> ○ None
Jessica	<ul style="list-style-type: none"> ○ Chemistry I ○ Introduction to Biotechnology ○ Chemistry II ○ Chemical and Biomolecular Engineering ○ Organic Chemistry ○ Material Science and Engineering ○ Engineering Physics II ○ Organic Chemistry II ○ Thermodynamics 	<ul style="list-style-type: none"> ○ General Chemistry Lab I ○ General Chemistry Lab II 	<ul style="list-style-type: none"> ○ Engineering Ethics ○ Writing Intensive: Genetics
Andrew	<ul style="list-style-type: none"> ○ Newtonian Physics ○ Introduction to Computer Programming and Science ○ Physics: Electricity and Magnetism ○ Introduction to Chemistry ○ Circuits ○ Astronomy ○ Physics: Waves ○ Quantum Physics 	<ul style="list-style-type: none"> ○ Experimental Chemistry ○ Physics experimental lab I ○ Mechanical engineering Lab ○ Physics experimental lab II 	<ul style="list-style-type: none"> ○ Physics research

Erin	<ul style="list-style-type: none"> ○ Foundations of Biology ○ Introduction to Neuroscience ○ Neuropsychology ○ Educational Psychology and Neuroscience 	○ none	○ none
Totals	25	9	3

Lecture as primary teaching approach in natural sciences. Natural science majors reported having lecture as the dominant form of teaching in their natural science and engineering courses. The four natural science majors, Wyatt, Andrew, Jessica, and Erin, took a total of 37 natural science courses over their first two years of college. Of these 37 courses, students reported that 25 natural science and engineering courses were primarily or exclusively taught in lecture format. The descriptions of these courses being lecture-based were unprompted and often shared when students were asked “what was the structure and format of this course?” during the semi-structured interviews. During the interviews, students described 25 natural science classes (of their total 37) as “lecture based,” “lecture-heavy,” “lecture format,” and “only used lecture.” Using artifacts from the courses, in particular syllabi and lecture powerpoints, I analyzed courses for their structure to determine and categorize the “type” of courses the students took (and triangulated these findings with students’ descriptions). Schedules and artifacts illustrated when course were lecture-based, and when courses were used for students lab work or discussion.

In the lecture-dominated natural science courses, there was another typical feature: recitation or discussion sections as part of the lecture-based courses. In courses with this structure, lecture often occurred two to three times a week and discussion would occur one time per week. However, students reported that the discussions and recitations across natural science courses and across institutions were often run as another lecture section or the recitations were used as optional and non-structured time. Most natural science

students indicated that discussions and recitations in natural science courses did not have meaningful grades attached to them. In my analysis, I found that of the 25 lecture-based courses, 20 had recitations and only 2 had grades of any kind associated with the recitation. In other words, students' performance, work in this smaller group setting, and potential discussion that occurred in these recitations was very often inconsequential to how well they did in the course.

Wyatt described his lecture-based courses and his recitations in ways that were similar to those across other institutions. Wyatt did not find the recitation sections or, at times, the lectures for his courses useful spaces to advance this learning. For example, based on his descriptions, I defined four of Wyatt's seven natural science courses as lecture-based; the other three were lab-based courses. Wyatt's natural science course types are in table 5.4. In the four lecture-based courses, Wyatt had recitation sections for at least one hour per week in each course. However, three of the courses did not include any grade associated with the work in discussion sections. In one course during the second semester of his sophomore year, the syllabi indicated that the course assigned 25 points of the total 550 (4.5%) to the discussion section that could be achieved just by attending the section. In his interviews, Wyatt emphasized the ways the lecture attempted to cover a large amount of material and often the discussion-sections were used for teaching the small rules involved in the material. These details, he explained, often related to rules and knowledge needed for working on homework and problem sets. In essence, lectures and discussion sections both became lecture-oriented space, structured for "telling" information to students.

One representative example of science lecture and recitation course work came from Wyatt in his organic chemistry experience:

In organic chemistry there's three lectures a week that are an hour long. Then there's a discussion which is once a week, also an hour long. I went to that every time, but probably didn't have to. **It wasn't graded, so it didn't matter. About a quarter of the people actually go to that because it is not that helpful.** During lecture it is mostly the professor introducing ideas and then going over problems. Then, in some discussions it is usually going over problems and making sure people understood **all of the little rules that are not necessarily talked about very much in lecture but are actually really important for some problems....** because of the way the courses are structured it is sometimes difficult to know the rules and the approaches when your professor is just telling you about these approaches. You didn't exactly come up with the approach. (Wyatt, interview, 5)

In this excerpt, Wyatt highlighted a few attributes of college science learning. Lecture-based courses spend the majority of the time telling students information. This may take the form of completing a problem, but, as Wyatt explains, "your professor is telling you about these approaches." Given the breadth of information science courses attempt to cover, the default mode is telling the students about the approaches to science knowledge, but little time turning these processes over to students to engage in. Wyatt lamented that the students had to learn "all of the little rules" and that "it is sometimes difficult to know the rules and approaches...you didn't exactly come up with the approach." Wyatt emphasized how the professor in this context was doing the intellectual work of problem solving in this course and not the students. The spaces of lecture and recitation controlled the knowledge construction and production and only allowed students to "enact" the small rules and approaches that were told to them by instructors. The model remained a transmission style of education where information is possessed by the expert (professor) and is received by the student and not through active problem solving and engagement. This model of education has been advocated against (NRC, 2000, 2005).

Jessica experienced a similar pattern in her lecture-based course and recitation sections to Wyatt. Jessica reported that recitations, like in Wyatt's case, became another space for lecturing and another space for reviewing information provided in lecture and in the textbook. As illustrated on table 5.4, of her 13 natural science courses, eight were lecture-based (four others were lab-based and one was a writing intensive course). Of these eight courses, seven had recitations or discussions sections associated with the lecture course (the eighth course did not have a discussion section as it was smaller in size). Zero of the seven had a requirement to attend the recitation or associated a grade for recitation component of the course. As one example of how recitations and lectures were used in her experience, Jessica's thermodynamics course syllabus explained that recitations would be used "mainly to review material discussed during lecture, and occasionally to introduce new material (to make up for what is missed in lecture)" (thermodynamics syllabus, Jessica, p. 1). All eight courses heavily relied on exams and homework as the sole determiner of grades. In another illustration of the dominance of lecture, Jessica noticed that her physics class was so lecture-focused that it ignored the collaborative and interactive space available in a new classroom where the class was held. Jessica said of the physics class that it was "kind of sad because we were in an interactive classroom where they had boards and tables, and he didn't use it. He's lecturing in an interactive classroom. It's like, why?" (Jessica, interview, 5).

As Jessica described, her recitations and lectures were almost entirely structured the way she described her physics course: a professor or instructor providing information, she engaged in notetaking and translating this information for problem-sets and homework. Jessica did not experience any recitation section that used group discussions,

participation, collaborative problem-solving, or other scientific practices within the context of lecture or recitation time nor were any associated with a final grade in the course. In analyzing course artifacts, I did not find indication of discussion or collaboration during these recitation periods. Instead, the course materials reiterated and reviewed lecture through extensive notetaking and example problems that students worked on and thought about individually.

Erin, a neuropsychology and neuroscience concentration at a liberal arts college, had only four natural science classes during her first two years of school, as she was completing core requirements and taking what classified as social science courses for her psychology component of her major. Erin did have lecture-oriented courses but did not have recitations. Her courses were smaller on average than the other institutions' class sizes; however, even the small size of courses did not mean that the courses included discussion or interaction. Erin described that all four of her natural science courses were "pretty lecture-heavy" (Erin, interview, 5). The lectures were also linked to the exams that also dominated these courses. In her biology course, Erin described how her professor had objectives each day of what she would cover, she would post them online, so when we had to study for an exam that would be our study guide... I just studied and memorized those [slides] for exams" (Erin, interview 3). In another instance, Erin described that she had so much content to cover from lecture that would be included on exams that Erin decided to hire a tutor to help her study and review the notes, textbook, and keep up with the amount of material in the course (Erin, interview 6).

Andrew had a total of 13 natural science courses, and among these he had seven that he described as lecture-heavy. He had 5 that he classified as lab-based. All seven of his

lecture-heavy courses had an associated recitation section, and only one had an associated grade with it, which was a physics courses that counted attendance at recitation toward five percent of the final grade. In describing his courses, he indicated that many were large lectures with a recitation, “these were never discussions or anything. Some we would come in and do problems ... And in others we were just kind of reviewing the material and the TA would just give more examples. The same as lecture” (Andrew, interview, 5).

Lectures operated in such a way that it seemed to not matter if the students were present or not; as Andrew described for a computer science, “the class started out with about 150 people in it, but because the lectures are all posted online, the first lecture everyone was there. And then the last lecture there were maybe 20 people” (Andrew, interview, 3). The other students’ excerpts illustrate the issues with approaching teaching primarily using lecture. Students felt disconnected and like passive learners in this context. Lecture rarely positioned students to engage in meaningful inquiry, interactions, discussions or in constructing knowledge. Instead, students listened to lecture, then used the professor-delivered information to engage in some problem-solving in science courses. When other structures had been put into place to assist with teaching and learning in a small setting, lecture still dominated the approaches in these courses. Even if the recitations and discussions were not only lecture based, on the whole these sections still lacked a meaningful purpose, which was echoed by all students who had such sections. The learning in these spaces were not about the students exploring ideas within the group and the professor, but rather a transmission model of teaching and learning (NRC, 2000) that seeks to deposit knowledge into students’ brains from the professor or teacher. This

indicated that many professors likely did not know what their students came into their courses knowing and the skills students may have possessed within the natural sciences.

The nature of lab-based courses. Most of the courses that natural science majors experienced in the first two years of college were lecture-based (25 of 37). Another structure of courses were lab-based courses, which constituted nine (9 of 37) of the courses for the natural science majors. As can be seen on Table 5.4, Wyatt had three lab-based courses, Andrew had five lab-based courses, and Jessica had two lab-based courses. Erin did not have any courses that were classified as a scientific lab environment. Her courses included demonstrations within the lecture section but did not have lab-based components. Lab-based courses were sometimes associated with a lecture-based course, but more often labs operated as an independent course separated from any lecture course. All three students who had lab-based courses expressed dismay about the lack of alignment and the confusion the learning activities and experiences rendered as it related to the “content” they were learning in their lecture courses.

Before analyzing the learning inside of lab-based courses, it is worth providing another layer regarding the valuation of these courses within the context of natural science majors’ coursework. Using documents from the institutions regarding “pathways” through courses and requirements, I found that across institutions, lecture-based courses constituted overall more credit hours toward students’ majors and degrees than the lab-based courses; lab-based courses were usually credited half or even one-fourth of the credit hour designations of lecture courses. For example, even though Wyatt was in three courses that were labs associated with a lecture course, the labs were only worth a quarter of the total credit hours that the lectures were; in this case, it was a physics course worth

four credits and an associated lab was worth one credit. This was despite the labs comprising as much classroom time as the lectures per week (sometimes an hour more than the lectures). A representative example of this pattern can be seen in Wyatt's overall credit hours of science coursework; over two years, Wyatt took 20 credit hours of natural science coursework and the associated labs totaled 6 credit hours. This pattern was true for Wyatt, Jessica, and Andrew, but Andrew also had some labs that were valued with equitable credit hours to lectures, as university documents and syllabi indicated. This difference in credit hours may have communicated, at least implicitly, the value of the course and the work within the course to the natural science majors, and it may have communicated also the confidence (or lack of confidence) that departments have in assessing and supporting students' abilities in lab courses.

Within these lab-based courses, students had varied experiences regarding the disciplinary engagement, opportunities for domain-specific reading and writing, and for opportunities for collaboration. Even within lab-based courses, I found that students experienced some amount of additional lecture. As Wyatt explained:

Even the lab had a lecture at the start of the week before we did the lab to tell us about the science we were doing. Then, we did the lab and wrote some things, but not very detailed in grading or anything. I think it was more for the experience. And then we had another lecture about what we should have found. (Wyatt, interview, 4).

Jessica had a similar experience to Wyatt in what she called "lab lecture" which often happened before and after her lab experiences. Jessica explained that the lab lecture was "to catch people up because there was often a steep learning curve for some people. I didn't really pay attention because I definitely didn't need it" (Jessica, interview, 3). Andrew in his lab-based courses explained that often the lecture at the start of the week was "introducing

the next week's material, giving an overview of it. The next day of the lab class was just doing that experiment" (Andrew, interview, 5).

The use of lecture and a "telling" pedagogy within the lab-based courses again communicated the transmission model and passive receipt of information and knowledge the students experienced in lecture, even within a space that may have been intended (in theory) to be used for collaboration. Because of their background in lab-based work in high school, it may have been the case that these students were expecting a different experience in the lab environment. It seemed that the students were so prepared that the prescriptive nature of the "cookbook" labs made this learning repetitive and boring. The attempts at supports – likely the purpose of the lecture before a lab – were not useful to these students because they had background and experience with these practices. Further, these data indicate that from the students' perspective these labs may be more for "being in a lab" and not to enact an inquiry-based lab, because as they described from the outset, professors and teaching assistants "told them about the science we are doing" (Wyatt, interview, 4) and not as a way for student to inquire or design experiments or investigations.

Scientific practices, reading, and writing in lab-based courses. To understand more about how lab environments advanced scientific practices of disciplinary literacy in science domains, I asked students about the scientific practices, reading, and writing that was a part of their lab-based courses. I also closely analyzed the supports, documents, and artifacts as a way to understand the students' descriptions. Students reported limited experiences with collaboration, and they described that ultimately lab reports were completed individually and not collaboratively. Again, students reported that lab-based learning became prescriptive, repetitive, and at times, boring. Learning experiences

seemed to be reduced (and in this case repetitive and developmentally inappropriate) to a model of knowledge transmission or “cookbook” procedural lab experiences (e.g., Bell, Smetana, & Binns, 2005). Students reported enacting labs, but were not designing or authentically engaging in them. It seemed that the students were doing “school science” and not learning about science within the disciplinary community or toward disciplinary practices. Students reported doing some writing and some collaborative work in their labs, but ultimately, they completed the final products of lab-reposts and explanations individually. Students also described that the writing for lab lacked specificity or norms (other than formatting) and the writing that was conducted rarely received feedback.

The following excerpts from Wyatt serve as representative examples of other ways students in natural sciences described their lab-based learning. The following two excerpts were taken over a year period, however, Wyatt’s lab experiences seemed to remain constant. When I asked Wyatt about his experience in his lab-based courses, he reported that the labs were mostly inauthentic and not how a “real” lab would operate. Wyatt interpreted that the lab experiences and the writing that resulted were both unrealistic, basic, and were not precisely graded nor did the labs provide valuable feedback. Wyatt described his lab experiences in chemistry and biology:

We did a couple of things which....an organic chemist would not do. I know from working a lab...Nobody would *really* do it this way...it’s that kind of thing. It’s like an early high school level experiment because these are introductory lab classes and the labs are kind of artificial that way. Just showing us things, but not the way a lab would really work...so we’re not doing anything super crazy. (Wyatt, interview, 3).

...[instructors] didn’t really focus on the way you record it...mostly filling out a lab book. They [gave] us a format, but it isn’t really exact and it wasn’t graded exactly either. It wasn’t bad for grading, mostly participation and completion...the labs are already set up and you just do the lab, get the results, and do a brief write up...They gave us basically a handout that said

'Here is what you do.' The TA [teaching assistant] would explain and give us a little but more about various procedures.... pretty much, you just do the lab exactly as they have it written." (Wyatt, interview, 4)

Throughout his college experience, Wyatt worked in a biology-focused research lab on campus. He was working almost 20 hours a week in a lab environment, and therefore, contextualized his experience in the lab-based course with his work in a "real world." He thought that the work he was doing in the lab-based courses were experiential and not realistic about what happened in an operating lab and were "artificial that way" and the labs were meant to "show us things." Wyatt also explained how prescriptive the labs environments were with procedures to execute "the lab exactly as they have it written," but at the same time described that the [instructors] "didn't really focus on the way you recorded it." The other students, like Wyatt, were prepared for more than the labs required of them. The literacy skills they possessed within science were underused and overly prescribed. Wyatt saw the labs as a "high school level lab" and not as a disciplinary model of how lab work operates in the science domain; he went elsewhere (the lab in which he worked on campus) for that experience and information. Wyatt indicated that these labs were not necessarily a helpful space to advance his knowledge of disciplinary literacy practices and knowledge, especially given the lack of feedback from instructors. He reported that the "format...isn't really exact and wasn't graded exactly either" which indicated a lack of specificity or transparency about the literacy practices that a scientist (or apprentice) may write about their lab data, explanations, and analysis. Lab work, in this case, seemed to be about enacting it and doing the lab, but did not make visible the purpose, the practices, the importance, or the disciplinary literacy skills that should be gleaned from this activity. It was, as Wyatt described, "more about participation and

completion” and not about how students advanced literacy skills or their developing thinking. Although Wyatt was talking about his biology course particularly, this sentiment of a lack of specificity or support about lab writing was representative of the ways the natural science students described their labs across contexts. On the whole, the natural science majors did not emphasize extreme challenge with lab-based work the way they described the difficulty and frustration with exams in some of their courses, for example. Jessica echoed Wyatt’s sentiment about lab-based courses. She explained:

I also felt far ahead in lab practice. In the sciences, I just felt far ahead... My writing skills were much further along than others it seemed. Science knowledge in general, but lab practice specifically. I'd done all the labs, except for aspirin. I'd done everything. Logger Pro, electro spectroscopy, empirical formula lab. Everything, I'd done everything in high school. I was one of the fastest people in the lab. I knew what I was doing and didn't necessarily need the lecture or preparation before the lab. So between the high school labs I have done and working in a lab, I was way better off than most everyone else.

Jessica felt prepared for the lab and explained that she rarely needed the supports offered in the lab environment. She was often the first to finish her work and reported not needing explanations in the form of lecture before and after the lab experiences. It is important to note that although Jessica did not need the additional explanations and lecture from lab, other students who did not learn this material previously were also not given opportunities to explore these labs, the design, the explanations in meaningful ways if the lab was composed of lecture and “telling” about science. I asked her about how her writing and reading for her lab classes compared to the work in high school. The high school experiences were similar in format and, at times, even more detailed and rigorous than in college. Jessica explained that her lab writing was:

Almost exactly the same [between high school and college], actually...It's always the post-lab questions that vary. Then you didn't always need a full lab write-up. Way less calculation based than high school, actually. In high school, we had to do a lot more calculations and show our calculations. Whereas, they didn't really care as much here... People were complaining about writing 2 full lab write-ups, whereas high school, we wrote up a full lab write-up every time and we did a lab every other week. They were due faster and we just had more analysis and details to attend to. The format was the same...Purpose: basic, one sentence. Explain the lab. Never did a materials section. Procedure, basically the same sort of thing. Specific numbers, yes. Past tense, explain the procedure, but assuming they have basic knowledge. Discussion, very similar to high school. It's an error discussion. Summary of your results, an explanation of the results. Explanation of any outliers, discussion of possible errors, and sometimes- We didn't really focus on this in college, but in high school we did applications for the future. (Jessica, interview, 6).

Jessica listed the skills and approaches that she brought with her to the lab environment as it pertained to writing and reporting lab-based work. This work was familiar – “exactly the same” as high school. She elaborated on the “rules” that she brought from high school to approach the lab write ups – “purpose, one sentence. Explain the lab...past tense, explain the procedure.” Similarly, I asked Andrew about how his college lab writing and activities compared to high school, and he explained: “it wasn’t that different in what we were writing and how I thought about science, maybe it was a bit more formal – we had a lab book and then I went home to type up the reports and answer even more extended analysis questions about the lab. Writing everything down and documenting during the lab is the same” (Andrew, interview 3).

To provide one disconfirming case about lab-based learning, as Andrew progressed in his lab coursework, during the end of his sophomore year, he described that his physics courses had asked him to elaborate more on conclusions by relating them to theory. Andrew said that he would type up a conclusion that explained “here is what the data look like, here is what they are saying, and here are some questions that got answered when we

looked at these data. It wasn't too formal, but it was telling what we say and writing conclusions about it" (Andrew, interview, 6). He reported that, it changed the lab notebook from a "a bunch of logs of what you did, to something with information on how to repeat it and what your results were with connections to explaining theory" (Andrew, interview, 6). In analyzing documents from courses, Andrew's lab syllabi described the importance of a "complete record of the work you performed" and to "complete the data analysis...and use plenty of space and clearly highlight important findings and conclusions regarding the adequacy of theory" (physics lab). Andrew indicated that this writing was not "too formal," but did transform his lab notebook from a "log" into information "on how to repeat it and what your results were." This marked an interesting shift toward the later part of his lab-based courses, but was not necessarily a shift I found for the other natural science majors. In analyzing some of the documents from Andrew's lab-based courses, I found lab manuals that provided hundreds of pages of details for the "apparatuses" that the students would use to complete labs. These documents took focus, review, and independently navigation to understand and interpret the apparatus. Andrew indicated that TAs told students much of what they had to know in order to enact the lab, but this independent pre-reading of the manual was used to prepare for the discussion with the TA. Further, lab documents indicated the importance of "exploration" in lab and described lab as a space for "introduction to the rigors of...activities engaged in by professional experimental scientists." Several of Andrew's lab-based courses indicated that the goal was for students to understand theoretical models of science. However, the courses also described the "each experiment will have a preassembled...procedure and equipment for students to use." Although Andrew had to navigate reading in order to prepare for lab experiences and also

had writing following these labs, the procedure, design, and enactment was prescriptive and pre-determined. In this way, despite being sophisticated, the lab experienced may have fallen just short of student-driven inquiry, investigation, and experimentation.

Across institutions and courses the natural science students' experiences in lab-based courses posed important considerations about college readiness and disciplinary literacy skills. First, the students felt very prepared for their lab-based courses and the work that was a part of them. In fact, the students expressed times that they were bored, that the learning was repetitive, and that the labs were overly prescribed (especially compared to learning they had engaged in during high school). The repetitive experiences of these labs by many of the students also illustrated that the instructors may have been unaware of the knowledge and experiences that students brought into the courses with them, even in regards to the exact labs in the courses. It seemed that professors and instructors did not necessarily think about this space of lab-based courses as the space to apprentice students into the nuanced disciplinary literacy skills of various science domains. Although these students were "prepared", it seemed to be the case that they were also ready to do more than college asked of them and resulted from their professors not entirely knowing what skills and dispositions their students came into their courses possessing. Likely it was these experiences that prompted students to create "real lab experiences" for themselves to supplement their learning in the science domains: a case presented in the Chapter VI. In sum, most of the lab-based courses did not advance the disciplinary literacy skills of science for these students, and only small moments offered new learning opportunities and instances of domain-specific learning about experimental and investigation work in science.

The nature of collaboration in lab-based courses. Many may think that the lab-based courses, even more so than discussion-based or recitation courses, would be the space for collaboration and group work with other students in the natural sciences. Although students reported working in lab groups, they did so in somewhat artificial ways, working together mostly to execute the prescriptive lab and not in ways that promoted problem-solving or design work with groups. Wyatt explained that in his chemistry course:

...we would get assigned into groups for the long lab period. Then we would do the pre-lab assignment, basically where we said what we would do, hypothesis, all of that. Write that out. Then, we would also take a specific molecule to do the reaction on and predict what the differences were going to be. Then, following the pre-lab, the students would do the experiment, get the data, share the data. Then we all kind of go off and do a post-worksheet on your own. You have to analyze all of the results and you do the writing and the worksheet on your own. (Wyatt, interview, 4)

Bridget: would you describe your labs as collaborative?

Wyatt: sort of, it is kind of like people doing their own thing, but you do part of the experiment with the group....kind of group work, but not really. You end up doing all the writing, lab report, and even conclusions on your own, individually...just from my own lab knowledge, it's way more collaborative than that. They're still trying- I know that they're still working towards more collaborative science classes because science and math and all of these, [they are] all collaborative [as disciplines]. There's very little individual work anymore, at least in the sciences...I don't know why they are still teaching it like everyone had to be individual; eventually in the sciences, we will always have to work in a group. I think the lab work is an attempt at getting to group work, but it isn't quite there. (Wyatt, interview, 4).

Wyatt illustrated the way he viewed the difference of “school science” in college and contrasted that with his own experience in a science lab. Wyatt explained that his “own lab knowledge, [science] is way more collaborative” than the group work from his science lab courses. He stated that “they’re still working toward more collaborative science classes” indicating that he notices a change in school science, but that it still lacks the active collaboration. Wyatt provided another layer of what school science or learning about

science in school looks like in comparison to disciplinary science work; because evaluation and grading happened individually, the work and artifacts of the coursework also ended up being individual despite the inauthenticity of this structure in a lab environment. In my own evaluation of the lab-based artifacts, Wyatt's labs openly indicated how grading was not based on the process of the lab itself, but in the individual final product; the syllabi and lab guides describe specific formatting and structural aspects of the reports, but said nothing about beneficial collaboration, the ways students could enact the lab, or the practices to attend to in the construction of the report. The artifacts from lab seemed to focus on procedural and not substantive practices in the science labs. It seems important that labs should include some specific instruction and practices about collaboration, group writing, and other discussion of evidence synthesis. It seems, by Wyatt's account, despite the collaborative intention, labs may still be quite individual experiences.

Jessica's lab experience was very similar to those that Wyatt described in regards to a lack of collaboration. Andrew's experience in labs was somewhat distinct, although still did not indicate collaboration, per se. Andrew's labs were largely independent endeavors. Each student executed labs individually and then wrote reports about these labs. Andrew explained:

...it was definitely self-directed; before the lab you would prepare some pre-lab and you'd learn enough of the material that you could have intelligent discussion with your TA. You would discuss briefly the experiment and show you the apparatus. Then you come in the next day and do the experiment, but it was on your own. (Andrew, interview, 6)

Andrew described that to prepare for a lab, a student reads the "pre-lab" material, discusses with the TA, and then the students enacts the lab individually. With the exception of Andrew, all other students experienced group labs environments (and Andrew also had

one course with lab groups as well). In analyzing documents from lab-based courses, there was an emphasis on these courses as individual endeavors for Andrew and his classmates; in one course, the syllabi stated “recitation is an...individual meeting with your TA...you must be prepared to answer questions regarding the experiment.” This is not to say that the structure of individual lab work is inherently bad, but it does indicate that collaboration and experience in group settings around scientific experimentation was not a core learning component of Andrew’s lab (or others).

The lab experiences were described as “neutral” by the natural science majors; what I mean by neutral is students thought the experiences were fine, but not exciting or a space that pushed their thinking. These were not spaces for deep disciplinary literacy learning, inquiry, or scientific investigation. The labs were largely prescribed and predetermined. Students enacted the lab, used their background knowledge of lab notebooks and writing to construct reports. Unlike the realities of science communication practiced in the professional community which are rule-governed, precise, and structured (e.g., Shanahan & Shanahan, Misichia, 2011), students described writing as being imprecise, informal, and lacking rich feedback on ways to improve scientific writing, especially regarding experimentation and reporting results. Although there were some moments of positive disciplinary experiences, these lab-based courses constituted a very small part of students’ overall experiences in the natural science. It seemed that students recognized these spaces as experiences of “school science” and not engaging in science in a way that disciplinarians construct and produce knowledge. Further, the structures of the lab courses again indicated that professors (and teaching assistants) did not think or construct these spaces to apprenticing students into science domains. If they had been conceived this way, there

would be less prescriptiveness, less “telling,” more depiction and investigation of scientific literacy and communication in writing and reading.

Limited diversity in texts, tasks, and assessment-types in natural science. In analyzing assessment types, texts, and tasks, I found that across all domains exams dominated assessment types and there was overall limited diversity in the texts used and assessment types valued across domains. In natural science majors’ coursework, this limited diversity in assessment types and texts took a particular shape with its own sub-patterns. Natural science majors’ coursework included sub-patterns of: a) a heavy emphasis on exams; 2) the prevalence of textbooks as the main text across domains of science; and, 3) the use of homework and problem sets as a periodic and often weekly learning and teaching structure.

To understand more about the assessment types, texts, and tasks within the lecture-based courses, I removed the lab-based courses and analyzed only the tasks and texts within the lecture-based courses. Within the natural science major coursework and within lecture-based courses, the emphasis on exams is revealed in the assessment percentages. Table 5.5 displays the natural science assessment distributions for final grades. Seventy-five percent (75%) of final grades are based on exam scores across institutions and across domains of science. This increased by 15% from the larger sample of all 11 students and the exam-based grade in natural science courses. Quizzes (4%), projects (3%), papers (3%), and attendance/participation (2%) are valued even less than in the larger sample, on average. Homework dropped 4% from the larger sample trends but remained the other highest percentage of grade distribution in the natural science courses. With such low percentages attributed to this work in final grade, writing, projects, participation, and

quizzes were not included as meaningful components of these four natural science majors' core coursework. In the next section, I examine the two assessment types with the highest value across courses: exams and homework.

Table 5.5: Within Lecture-Based Courses, Percentage of Final Grades Determined By Assessment-Type, on average

	Final exams	Exams/midterms	Quizzes	Homework	Projects	Papers	Partic./Attend.
Natural Sciences (n=25)	38%	37%	4%	13%	3%	3%	2%

Exams and homework. Students' experiences of exam heavy course work and the associated homework in natural science courses offer insights into how students understand and interpret this work, how they prepare, and how these even well-prepared and "ready" students struggled in these course demands. The four natural science majors emphasized repeatedly during interviews that they took many exams in their natural science courses. In analyzing the exams that the students provided, I found that some exams required problem-solving skills, computational skills, and the synthesizing of knowledge toward particular problems and questions. To provide one illustration of how considered the nature of exams, below is one example from Wyatt's organic chemistry exam. One question on the exam, in providing a chemical reaction in symbol form, asked students "what is the limited reagent in this reaction? Explain." And the question that followed stated "assume that only 70% yield is expected for this reaction. If you wish to obtain ~500 mg of product how much 2-bromo-methylpentanoic acid should you start with?" In this example, Wyatt had to determine a reaction, answer correctly and explain it, and then use this information to calculate an aspect of this reagent in the calculation that

followed. It required some memorization, but also tied the memorized knowledge to computation knowledge and some explanation of concepts.

At other times, exams had rote and memorized responses and routines. One representative example is drawn from analyzing Erin's neuroscience exam review guide. The exam had multiple parts including definitions, short-answer questions, multiple choice, and a short essay. On the review guide, the professor indicated that students "do not need to write in full sentences" on short answer or essay, but "needs to have enough detail to understand the answer." I observed this lack of attention to language and confusing examples across many study guides and exams. On the neuroscience study guide, students also had multiple choice questions that were "new" and some that would be repeated from the previous exam. These multiple-choice questions were purely rote and memorized responses (and became even more rote when they were repeated from previous exams). Erin explained that this course's exams were mostly memorization and to prepare she reported "memorizing the powerpoint slides, previous exams, and study as much as possible before the exam" (Erin, daily diary, 1).

It is beyond the scope of this dissertation to chronicle each question on all exams in science (or across domains). What I am able to illustrate is the large amount of emphasis placed on the exams themselves as artifacts and evidence of learning in these domains. The grade emphasis communicates this import, as does the time that students reported studying and memorizing for the exams in their daily diaries. Science majors reported the most frequent activity was preparing for exams. Students reported they spent time "memorizing a study guide," "memorizing key words at the back of each chapter," "retaking an exam, studying notes, and lecture slides," and "reading my textbook and doing practice

problems.” Exam preparation constituted 90% of the daily diary responses from natural science majors. Despite the variation on what the exams are assessing and however unintentional or intentional, the emphasis on exams as a core activity of science learning communicated to students that this was the work of science and how one progressed toward being a scientist, instead of the disciplinary literacy skills, practices, and inquiry that could be foregrounded as students apprenticed into science domains.

Natural science majors had another structure as a part of their learning; students told me that homework was used to “prepare” students for exams and the problem-solving work involved on exams. In the following excerpts, I provide a range of typical experiences among the natural science students regarding their learning on homework sets and exams. Students reported overall having confusion about how to monitor their learning on homework, especially when feedback was not common. They had confusion about how to study for exams, and increased difficulties when the course lecture or homework did not align with the heavily weighted exams.

Jessica described her second year of college as “a problem set year” because of the courses she was taking and the amount of homework and problem sets she completed. She said:

Last year was like read, read, read, read. Then take some exams. This semester was problem set, problem set, problem set. Definitely I was getting into more technical or problem-based classes...This year is problem sets and hope it gets you ready for the exams. (Jessica, interview, 6).

Bridget: Does your college [engineering] or your professors or anyone at school teach you how to approach this amount of problem sets or how to think about problem solving in the context of your classes? Did you feel like school taught you how to do that?

Jessica: Hell No!... ***you have to figure it out yourself...there is so much independence about how you approach the work and your problems.***

Some professors don't even give you feedback or grades on homework.

You have to check it, monitor what was right or wrong and figure out what is missing in your understanding. And I am not going to lie that is hard when you don't know the material as well as your professors and the people who made the problems" (emphasis added, Jessica, interview, 6).

Jessica described how homework and problem-sets were a large part of her experience in courses. However, questions remained about the relevance of these problem-sets in science learning. It seemed that these problem sets were used to prepare students for exams, but did they communicate information about how scientists approach their work or problem solving? These problem-sets seemed to be about learning a set of routines, procedures, and methods of computation, but not the kind of situated inquiry or problem framing that scientists uses these theories, calculations, formula, and approaches "solve." Andrew and Wyatt communicated similar sentiments and experiences as Jessica about homework sets and preparing for the various exams as part of science courses and navigating these demands independently and without substantial resources. On the problem sets, I asked how Andrew received written feedback from professors or TAs, and he explained:

you get the problem sets returned with marks on what you did wrong. Typically not really feedback, just points off. You can go to office hours or something to follow up on that. Yeah, you can go to office hours and ask, 'what's the right way to do this? How did I lose points on this?' (Andrew, interview, 4).

In his genetics course during his sophomore year, Wyatt explained that this course was:

probably the hardest science class I've taken so far. That was a really tough class...the thing about the homework was the questions didn't really have much to do with the exams. They weren't questions similar to what you get on the exams, so they weren't helpful and I am not even sure why we were doing them. They didn't reflect how difficult the exams were" (Wyatt, interview, 6).

Students reported other instances when it was not always evident how to study for an exam. Wyatt described relying on lecture to provide the basis for knowing what was on the exams in his biology course, but then found out that this was not the case. Wyatt said:

I ultimately did fine with it, but on this exam, there were a huge number of stupidly specific questions...it was just unexpected. The professor kept saying 'everything you need to know for the exams is in lecture.' But, that is not remotely true. Some slides in that class had 15 different medications with biology names for chemicals and everything. Like we have to memorize this?" (Wyatt, interview, 5).

The natural science students' experiences illustrated the difficult learning structures they had to navigate. For example, students reported having confusion about homework and problem sets and not receiving feedback unless it was independently solicited. Students described spending an enormous amount of time on problem sets and homework each week. However, feedback on homework and problem sets were often lacking. The goal in these problem sets was to determine the right answer, the driving objective of this work, which is quite contrary to the work of scientists. Erin explained how in her neuroscience courses she would take quizzes on memorized material from the textbook, but then entirely different questions on exams, but on material about which she did not have opportunities to develop skills or understanding. She felt like questions were meant to be "tricky" or "specific" and in this way was a more punitive experience than a way for her to show her knowledge (Erin, interview, 5). These examples illustrate that the intention of the exams and homework was not necessarily to move students along a learning trajectory of science domain knowledge and apprenticeship, but rather a perceived "objective" way to determine who does or does not possess certain, transmitted knowledge. Exams and homework become assessments of this transmitted knowledge.

The relationship among assessments and the goals of these courses remained vague. Further, the kind of work most often encountered and engaged in by these natural science majors did not include the scientific practices or inquiry-driven experience recommended by research and best practices in science education (NRC, 2005, 2012; NGSS Lead States, 2013). The work in courses were disconnected from the practices (e.g., problem framing, gathering data, analysis, evaluating claims of others) that are practices regularly engaged within the domains of science. The relationship between the exams and the homework/problem set was not always clear to these students. The lab experiences, tests, and problem sets felt artificial to these students. They communicated this feeling when they noticed the structures as not representative of the domains of science and more indications of “school science” learning. As one example, Jessica explained, in physics: “the exams were only 50 minutes long....and there would be six problems. I honestly think I would have gotten a letter grade higher if it was just an hour and a half, if I just had time to think” (Jessica, interview, 5). With this artificial time restriction, was this assessment a genuine depiction of Jessica’s knowledge? Or do these structures reinforce inequities and artificial boundaries on the knowledge that is portrayed and valued in college science? Jessica and her fellow natural science majors’ experiences raises the question about the intention of exams and exam-based problem solving. What is the benefit of exams and exclusively individual problem-solving? What are other ways to assess students in the natural sciences? How could problem-sets and problem-solving engage students in the kind of thinking, constructing, and practices that we hope for natural science majors to develop and for what purposes? The limited texts, the lack of feedback, the lack of resources, and the constrained aspects of these tasks placed enormous responsibility on the students to

navigate all instances of confusion. The students interpreted this as largely individual endeavors and how college requires that you “figure out” information yourself. The work that students described in this section – in which the lack of inquiry and investigation is noticeable – was the most common and routine kind of work among natural science majors in their science courses.

Prevalence of textbooks in natural science courses. Of the 25 lecture-based natural science courses that students majoring in the natural sciences took, 22 courses had textbooks as the primary source for reading, study, for assignments, and other tasks. Three of the courses used coursepacks as the primary text associated with the courses. Across the natural science courses, syllabi rarely listed any other readings or texts. I observed only rare examples of students using a text other than a textbook in their science coursework; rarer still were any associated tasks with a text other than a textbook. During interviews, students described using textbooks to study for exams or to get problems as a part of homework.

Not only were textbooks the dominant and, at times, the exclusively used text in a natural science courses, students often referred to them as a main resource when the teaching in a course was not providing them enough support or understanding. The following exchange with Jessica illustrates the difficulty students faced with limited resources involved in knowledge building in science courses.

Bridget: What would you say to someone about what it means to be college ready?

Jessica: You need to be able to realize sometimes when your professor is not helpful. You have to be able to read the textbook on your own, and maybe even teach yourself...sometimes you might start using the textbook more than the information from the professor [because the information was clearer and more closely aligned to the exams]. (Jessica, interview, 5).

Jessica explained how textbooks may become the main resource of learning in a course as a result of teaching skill of professors or lack of clarity. This brings up important questions regarding how a student with fewer literacy resources and skills might navigate this demand. Larger still is the question of the kind of knowledge that is valued in these science courses if textbooks and lecture are the main resources of interpreting and learning about science concepts.

Erin described using textbooks for memorization that she was often quizzed on in her neuropsychology and neuroscience courses. In describing knowing how to use textbooks in natural science courses, Erin said, “you have to pay attention to what professors say about the text” (Erin, interview, 6). For example, she reported that one of her professors said “if it is not talked about in class, don’t bother learning it from the book. It won’t be on a quiz or an exam” (Erin, interview, 6). Erin had developed some skills (and in several indications her classmates had similar skills) around using textbooks and integrating this into her learning from lecture; Erin used the textbook to memorize material at the signaling of her professor, but this took some skill to notice how the professor used the text and used the descriptions in the teaching of material. Again, it was a skill Erin made use of, but a reasonable instance to question to exclusive use of textbooks in for science learning, as these textbooks were most often used as a vehicle for memorizing information for exams and not at all in a way that a practicing scientist makes use of textbooks and references.

An additional way to understand how students spent their time in their natural science courses was through the daily check-ins during midterm and exam weeks during their sophomore year of college. I conducted check-ins over a two-week period in the fall

(one at midterms and one at finals) and repeated the same two-week “check-in” during the spring semester. The four natural science students submitted a total of 108 check-in responses. Students provided self-generated responses about “what they were going to do today and the describe the aspects of this work.” The most frequently reported use of time among the four students during these check-in periods was: (1) memorize content for an exam (73 responses); (2) re-reading lecture notes (62 responses); (3) reviewing textbook chapters and making notes (48 responses); and (4) reviewing practice problems (42 responses). On only two occasions were students reading a text other than a textbook or completing some kind of writing, in this case it was Andrew typing up a lab report. Students also reported that the most common activity, as would be expected from the data presented in this section, was studying for an exam.

Textbooks dominated the learning in natural science courses and were used sometimes as a reference, a source of assigned/practice problems, and at other times for memorization of material or as a way to supplement confusing lecture-based instruction. This section notes how rare it was for students to experience any other text type in science. But, it also indicated the ways students used textbooks to formulate knowledge. Noticeably absent were the hands-on experiences, the other text readings, the investigations, and other inquiry learning techniques that could advance the kind of disciplinary literacy learning we would hope to observe in college. The use of textbooks illustrated not only reliance on a single form of text, but also signaled the valued knowledge in this college science context when textbooks were used in these ways and additional texts were not as much a part of the course readings.

Other assessment types and disconfirming cases. As the percentage distribution indicated at the start of this case study, the opportunity for natural science majors to engage in other projects or writing outside of their lab-based courses was limited. In fact, it was limited enough to describe a glimpse at each instance that students had for writing (in addition to lab notebook descriptions in the lab work section above) and projects in their science courses. In limited ways, projects and papers engaged students in inquiry, but most often it involved reading and writing, but the absence of an inquiry frame for the purpose of reading and writing. When the inquiry frame existed, I presented these as disconfirming cases – those that were distinct from the typical and observed patterns of assessments and learning across other natural science courses. The three examples of writing that I observed across natural science courses (as elaborated by students and within syllabi) are described and analyzed below.

In her biotechnology course, Jessica had one paper prompt that served as a final “term paper” at the end of the course. The prompt read:

Please write a five-page paper on a topic in biotechnology that you find interesting and which you have identified either from the course or the literature. It should be related to the material in class, but extend beyond what we have covered. The accompanying presentation should be no more than 5 minutes and describe the topic, its importance, key interesting findings, and potential applications.

Jessica wrote the paper about the 2009 Nobel Prize winners for Physiology and Medicine for the discovery of different portions of DNA necessary for cell life. Jessica’s paper chronicled the experiments and investigations that lead to this discovery. Although she did list citations at the end of the paper, she did not reference her sources or authors throughout. Through content analysis of her paper, I coded most of this paper as being explanatory or expository-style writing on the topic and not analysis or synthesis. She

indicated that there was no assignment sheet or additional supports on finding sources or on the format of the paper. The paper prompt was found on the syllabus and no other instruction was given, except a reminder of the due date.

In the second example, Wyatt explained one experience he had when a science course sought to integrate writing into his chemistry class. Wyatt reported that an organization from within the university dedicated to advancing writing across courses developed three assignments for the chemistry class and this served as an intervention to infuse writing into the courses. Wyatt described that the writing assignments in his lab class were:

...not good for this class and learning chemistry. The first assignment was 'write an allegory describing organic chemistry.' It had absolutely nothing to do with what we were doing in class. The point of it was to make it so science people would do writing. Okay, fine! If we are in a science class, then make us do science writing....it is clear that no one was trying to get us to know or understand that there is writing in science and that there is scientific writing that you could teach. (Wyatt, interview, 5)

Wyatt said the other two pieces were to "write a journal to yourself about your personal connection to an organic chemistry concept" and the last one was "write a memo to a colleague not in science about what a concept in chemistry is." He admitted the memo may have been a fair assignment, but went on to say, "I guess what I was missing was really taking what we are learning and write it for a science audience, we haven't done that in yet. Why does it always have to be for a non-science audience" (Wyatt, interview, 5).

The third example of writing was from Erin's neuroscience course, which provided her a prompt to gather a new article and write a short response four times during the year about a topic called "neuroscience in the news." Erin described the assignment as being interesting but "pretty informal." She likened it to the kind of writing she did as a part of

her “Everyday Analysis” journal in high school, but a somewhat less detailed. This response-style format gave opportunities for students to find everyday examples of neuroscience and write about it. Again, this writing, like others lacked much guidance in text use and also largely lacked an inquiry frame for why such writing would be interesting or important in science, or neuroscience specifically. Erin also indicated that she was given participation credit for this so the quality of response was not entirely important.

The three examples above illustrate the limited opportunities that students had for writing in their science courses, outside of writing in lab-based courses (which included periodic writing of lab reports). The type of writing was limited and almost exclusively for a non-science audience. Therefore, these activities did not advance the tacit practices often a part of science literacy and communication in science. Further still, the writing assignments lacked a necessary inquiry frame to provide a purpose for writing and producing a text. It shows the limited experience with writing students encountered.

From my analysis, I found three courses that operated differently both in structure and in use of texts and tasks from the lecture-based or lab-based courses analyzed previously and those included in the above attempts at writing assignments and I call these disconfirming cases. These courses are outlined on table 5.4 in the discussion-based courses column. Andrew had one course that was a physics problem-based, discussion-based course. This class operated in a flipped classroom style and used the majority of in-class time to work on problems in groups, discuss approaches and interact with the professor about different ideas and solutions. From his description of the course, it was collaborative, discussion-based, inquiry-driven, open in approaches, and provided challenging problems that involved extended attention and critical thinking. Students may

spend weeks on the same problem and in sharing approaches learned more about the ways that different physics problems could be thought about and solved.

Jessica took two courses that were more discussion-based than any other courses she or any other natural science students described. One was an engineering ethics course that used discussion as the main mode for teaching and learning. The exams, although timed and individual, were one of the only examples of open-ended writing exams I found among the natural science courses. Jessica was asked to respond in four written exams about ethical dilemmas in engineering. Another course that was a disconfirming case was Jessica's writing-intensive course on genetics. As Jessica described she could have chosen any topic for her writing intensive but wanted to choose a natural science topic. In this way, the course was not intentionally structured as a requirement for a natural science student – as Jessica said, “I could have enrolled in the Harry Potter or Hunger Games writing class instead” (Jessica, interview, 4). In this course, Jessica produced a final portfolio using writing samples developed, peer-reviewed, instructor-reviewed, edited, and revised throughout the semester. In the end, Jessica had written a grant proposal, annotated bibliography, literature review, and a popular new article about a science topic. These writing samples were heavily-scaffolded and supported by the professor and encouraged revising writing. However, this writing-intensive course happened in the absence of a “content-driven” science course. The genetics component of this course was a theme that drove reading and topics of papers, but not necessarily a course on the scientific study of genetics. Even still, the experience of a writing-based science course was exceptional and the only one I observed during this study.

Conclusions on natural science case study. The case study of natural science majors' disciplinary learning and literacy experiences documented several findings:

- 1) natural science courses were dominated by lecture as the primary teaching approach;
- 2) natural science courses heavily emphasized tests and exams as a primary assessment type;
- 3) courses used homework, problem sets, textbooks and lecture notes to prepare students for these exams, but at times the resources were insufficient, incomplete, or not aligned when preparing for exams; and,
- 4) students took only a few lab-based courses, and even within the lab-based settings students did not experience collaborative work or rich experiences that advanced their skills within science domains

A small caveat of these findings is in order: In demonstrating these trends, I am not claiming that all lecture is misguided or that all exams lack disciplinary work and practices as a part of the problem solving and critical thinking. Nor am I claiming that students did not happen to find and develop ways to work collaboratively with other students in groups and teams to navigate their work. These findings present an important takeaway regarding natural science learning and teaching in college: There was little or no space or structures to support the kind of disciplinary literacy learning being encouraged by educators, research, and policy (Moje, 2015; NGSS Lead States, 2013; NRC, 2005). Instead, the main structures of courses were lecture, exams, textbook reading, and individual study, and the structures that lacked were collaboration, inquiry experiences, and use and development of scientific practices. Lecture permeated the courses and even into associated lab sections. Discussion or recitations sections were also largely reported to be used for lecture as well. This may have communicated something critical to students about their position in the domains of science. Knowledge construction, sharing, discussing, and collaborating lacked and it seemed that these aspects of learning were never “turned over” to students for engagement; the dominance of lecture indicated that the knowledge was held with the

professor and not with the students. Transmission of knowledge using “telling” as teaching were the ways professors and instructors communicated knowledge to students who desired to major in science. More important was the lack of an inquiry frame on much of the learning in these courses. Labs seemed to be more for the enactment of labs already prescribed in a “cookbook” fashion (i.e., already provided out step-by-step) (e.g., Bell, Smetana, & Binns, 2005), and not for “true” inquiry-based investigation where students were involved in the development, construction, decisions, or creation of labs. Reading was limited mostly to textbooks and did not include very few examples of scientific reading like academic journals, articles, experiments, or commentary. Writing was sparse and largely not the result of inquiry or as a way to advance disciplinary literacy skills within science writing. Instead, writing remained informal and often for presenting science concepts outside of the science community.

As compared to their science experiences of high school, college was highly controlled and often didactic. Students had little choice or variety in assessments or in the direction of their learning. It is worth noting that these students did not take classes alone; in other words, these experiences were shared among the close to 3,500 students that I documented were enrolled in the same courses alongside the four students in this study. There was relative absence of choice, of diversity in assessments, and constructive approaches to teaching in these domains. It could be said that students were often “learning *about* science” and “solving problems” and not, in fact, “*doing* science” or “problem solving.” The assessments and structures seemed to communicate that these natural science majors in college were rarely positioned or thought of as apprenticing into the field of science. Instead students were doing “school science” which focused on

transmission models of knowledge and not on the practices and development of skills as scientists. When I asked the science students about their most interesting experiences across all four semesters, not one expressed enjoyment or interest in any course the involved lecture or heavily test-based learning. Instead, they remembered and could share those rare, challenging, and interesting moments of projects, collaborations, figuring out concepts and approaches, and when they were positioned as developing scientists and thinkers. This is a critique often made of primary and secondary education settings, with the recent call for college readiness meant to remedy that situation. And yet, when these college-ready students went to college, they found that the apprenticeship into the sciences they had begun in high school was abruptly ended.

Social Science Majors' Literacy and Learning Experiences

In this section, I present the second and final case for this chapter. Within this case study, there were four students majoring in the social science domains. As a brief reminder of the students and their majors: Jane was a student at a large, research university in the Midwest majoring in International Relations and Spanish; Shyloh was a social theory and practice major with a community action and social change minor within the same university as Jane. Ryan was an economics major at small liberal arts college in the Midwest. Hope was a student at a medium size university in the Midwest, and she was enrolled in the business school focusing on marketing and public relations.

Jane, Ryan, Shyloh, and Hope took a total of 42 social science courses during their first two years of college. This case study provides analysis and patterns among these social science courses. Unlike the change that was noticed among the natural science majors and the increased emphasis on exams when exclusively analyzing their courses, among the

social science majors the overall assessment types and grade percentages were very close to the larger sample trends. The overall percentage of final grades based on exams fell by 3% and papers and projects increased by 1%. Again, a very small change in any of the assessment types and grading. The assessment types and the percentage determined as the final grade (on average) is provided on Table 5.6.

Table 5.6: Assessment Types and Percentage of Final Grades in Social Science Majors

	Final exams	Exams/ midterms	Quizzes	Home-work	Projects	Papers	Partic./ Attend.
Social science courses (n=42)	17%	27%	7%	4%	9%	26%	10%

In analyzing the 42 social science courses, I found that the fixture of exams in college was still noticeable, although the courses did also include an emphasis on papers as one quarter of course grades on average. I found that across all 42 social science majors' core courses:

- only 8 did not have exams or tests as a part of the final grade calculation;
- 44% of final grades were based on exams;
- 27 of 42 courses included paper writing in the final grade calculation;
- in contrast, only 17 of 42 courses included projects or collaborative work.

The blue shaded boxes in table 5.6 indicate the highest percentages of assessment types among social science majors. In what follows, I present findings related to the social science courses and the learning experiences within these overall patterns. Through rounds of analysis, I found that:

- 1) Social science courses relied heavily on lecture and within those lecture-based courses, exams were still heavily used as the main assessment type in the course. The second most frequently used assessment was papers.
- 2) Textbooks were prevalent among students' courses, but some courses included more variety in texts and some courses included multiple disciplinary texts;

- 3) Students had more variety in their tasks, mostly in the addition of paper writing, than their peers in natural sciences. However, when they did have papers and projects, the task lacked disciplinary tools and scaffolds to support the writing and projects which resulted in confusion among the students. Students navigated these tasks using their agency and other resources.

Course structures. To provide some clarity about course structures: I found two major types of courses – lecture and discussion-based. However, in four instances within lecture-based courses, students had adjacent discussion or recitations that would accompany a lecture once a week. There was variation in how this time was used. In two cases, an economics course and an American culture course, the attendance was optional and not graded. In two of the instances, learning and activities from the discussion sections were graded and integrated into the courses. Jane and Shyloh¹¹ were the students who experienced these adjacent discussion sections with graded components, and the details of this structure will be reviewed in the later sections of this case study.

Although there was more diversity found among the assessment types that students experienced and these assessments, papers in particular, were valued at about one-quarter of final grades on average, students' learning and course structures were still dominated by lecture formats. In total, I found that 30 of the 42 courses that the social science students took were primarily lecture-based. See table 5.7 for labels of courses by student. This was determined by the descriptions by students and also through analysis of the course documents, schedules, and requirements. This meant that students did not engage in discussions or in ongoing participation in these courses. Some of the ways students described the lecture courses included courses as having “powerpoints that were

¹¹ As a reminder, Shyloh's preferred pronouns are they/their/them. This will be used as the pronouns for Shyloh throughout the chapters.

reviewed,” (Ryan) as including “lecturing through the hour,” (Jane) and courses being “all lecture, we didn’t really have to talk” (Hope). That meant that 12 of the courses that social science students took within their major domains were discussion-based courses. I defined this as courses where students engaged in regular text-based discussions, leading discussions, working in groups or collaboratively on inquiry.

Table 5.7: Social Science Courses Taken by Social Science Majors

	Lecture-based courses	Discussion-based/seminar-based courses
Jane	<ul style="list-style-type: none"> ○ International Studies 101 ○ Economics 101 ○ Cultural Anthropology ○ Popular Music in American History ○ International Economics ○ Business of Music 	<ul style="list-style-type: none"> ○ American Culture: Race and Racism ○ African American Studies 400 ○ Managing and Administration in the Arts I & II (half of class guest speaker or case studies)
Ryan	<ul style="list-style-type: none"> ○ Psychology 100 ○ Microeconomics ○ Bioanthropology ○ Microeconomic Theory ○ Macroeconomics ○ Art History I & II ○ Cultural Anthropology ○ Macroeconomic Theory 	<ul style="list-style-type: none"> ○ Practical and Social Issues in Ethics
Shyloh	<ul style="list-style-type: none"> ○ African American Studies ○ Social Sciences: Understanding Power and Knowledge ○ Sociology of Gender ○ Social Theory for Social Change ○ Sociology of Education ○ Criminology ○ Group Relations and Dynamics 	<ul style="list-style-type: none"> ○ Introduction to Sociology through American and Iraqi societies ○ Social Science writing and research ○ Sexuality Studies ○ Introduction to Social Work
Hope	<ul style="list-style-type: none"> ○ Integrated Business ○ Introduction to Sociology ○ Microeconomics ○ Business Ethics ○ Business Management ○ Information Systems ○ Psychology 101 ○ Political Science: Civil Rights and Liberties ○ Public Relations (online course) 	<ul style="list-style-type: none"> ○ African American Studies ○ Feminist Theory ○ Journalism and Newswriting (half lecture and half discussion, but mostly lecture)
Totals	30	12

Prominence of lecture-based courses in social sciences. Lecture was observed as the dominant approach to teaching in the social sciences across institutions. In this section, I share small excerpts of each student's experience with lecture-based courses.

Ryan had a total of nine social science courses and, in analyzing his descriptions of his courses, I found that seven were lecture-based courses and one was a discussion-based course ("Practical Issues in Ethics"). As a reminder, Ryan was an economics major and attended a small, liberal arts school with class sizes that ranged from about 20 to 45 in total. Ryan was majoring in economics and all of his economics courses were lecture-based. Although he reported that some of his lecture-based courses involved cold-calling (calling on students without hands raised or without warning), they were not interactive or discussion-based. During an interview at the end of his freshman year of college, I asked Ryan how he felt he learned about college and how college works. In a brief exchange during our interview, Ryan reported:

Ryan: I think independence is definitely one theme. No one's checking in to make sure you're coming into class every day. I would say, group work wasn't, it was not as widely used as I thought it would be. Maybe that's just the nature of intro classes. It's more just giving you the material. I thought so much of how information was delivered was lecture.

Bridget: More than discussion?

Ryan: We had very, very little discussion, I would say. Econ was all lecture, psych was all lecture. Take notes all day. You just get used to that being how courses are, which is a lot different than high school, I would say. We did a lot of group work in high school, especially junior and senior year and I really liked doing that learning with other people. (Ryan, interview, 4)

Ryan raises the stark contrast he experienced from high school into college in regards to course structure, discussion, and group work. He indicated that there was "very, very little discussion" in his courses. This illustrated a marked difference about the values and

perspectives held in his high school and in his college coursework about how students learn. As an economics major, Ryan, through his major area coursework, encountered similar lecture-oriented structures and exams. I asked how his theory courses (more upper level courses) in economics went during his sophomore year, and he explained:

There were a couple of parts of those courses that made them a little shaky. In microecon theory, the tough thing with that class, the professor was really nice, but the in-class lectures were brutally fast and unclear. We had one kid in the class who would always point out things that she was doing wrong....probably just by going so fast...which got annoying at first, and then I realized, "wow, he is right. She is actually getting a lot of things wrong." That made these courses very difficult – the pace of the lecture and the lectures weren't clear about what we were learning or taking away from these. (Ryan, interview, 6)

In another lecture-based course, Ryan explained that his lecture and the assessments in the course did not align which rendered him uncertain of what to leave the course knowing and understanding. Ryan said, his psychology course:

...was dry. He was ok, my professor, just...his in-class lectures didn't really mesh up with the homework or the tests. Which make it hard to focus in class because there was no point really. Unless it was really interesting to you, which it wasn't for me at least...it is a really dense class... And [art history] was pretty boring. It was just the professor showing slides that you would copy down information. You had to memorize the dates and titles. That was it. So dry...twice a week, every class. It was not very easy to relate to (Ryan, interview, 4).

With the exception of one class, Ryan's experienced entirely lecture-based courses over his first two years in college. Ryan frequently reported looking for connections and for material to be relatable. He explained, instead that the lecture-based delivery of material was, "not very easy to relate to," "brutally fast and unclear," and that lectures were "dry" and "boring." Evidence in his experiences was the disconnect of lecture from the activities of the courses, the lack of inquiry guiding lectures, and the lack of participation and lack of feelings of inclusion.

Of her twelve total social science courses, Hope had nine that were lecture-based courses. As a marketing and public relations major in the business school of her college, many of her courses focused on business, management ethics, and other communications in these environments. In her first lecture, her introduction to sociology course, Hope described how this change of academic environment was a bit of a shock from high school:

the lecture experience was a little rough...there was like 150 kids in the class... I don't think that the professor didn't care, but she's like 'it's a class of 150. I teach four of them a day. I don't really know what you want. I don't know your name, I know your ID number, but that is really it'" (Hope, interview, 3).

Hope wanted opportunities to interact and discuss ideas. Frustrated with school after three semesters, Hope said, "I sometimes feel like, with lecture if no one is talking to me, why do I even go, because I can just get the powerpoints online and that is all you are going to do. Talk with the powerpoints. I can just stay home or work because it doesn't matter if I am there or not" (Hope, interview, 5).

Jane and Shyloh attended the same large, research university in the Midwest and were both a part of an honors program in the college. This program allowed students to advance quickly in language programs – Jane and Shyloh both finished advanced coursework in Spanish language within the first two years of college. The program also allowed students to select some "exclusive" courses that would keep class sizes small and provide a "small college feel" within a larger, sprawling campus. However, only one course in their social science coursework was a result of this program: Shyloh's social science research course, which was one of their discussion-based courses.

In analyzing their other courses, Shyloh had a total of seven of their eleven courses as lecture-based courses (the remaining four were discussion-based structures). And, Jane

had a total of six lecture-based courses of her ten, and four¹² were discussion-based.

Overall, Jane had much larger classes than Shyloh even within the same university. Mostly, Jane's program of study, international relations, had more students within the major area and caused class sizes to be larger. Her average class size was closer to 200 people (with a few classes closer to 20-30), and Shyloh's was closer to 75 students.

In describing experiences in lecture, Jane said that most of my courses are "lecture, and it is usually on pretty much general material...classes are always just a bunch of powerpoint slides... and then on your own time a bunch of readings and read the textbooks. Again, it was all lecture" (Jane, interview, 6). Shyloh described courses much in the same way as Jane; "some were smaller lectures, and lecture was how these courses mostly ran. One day a week we would go to discussion, but it was maybe 10% discussion and 90% lecture" (Shyloh, interview, 6).

Although Shyloh had several courses that included discussion and text-based learning, the lecture-based courses often fell short of their aspirations for learning in the courses. In one of their sociology courses, they explained, "in this course, we had these really boring busy work assignments. We had to read these articles and write a page-long response that were three to five questions long. Then, during lectures, she'd repeat everything we did in the reading. I am like, 'why am I here?' I already read this. It was really boring" (Shyloh, interview, 4). Feelings of boredom and purposelessness of lecture was

¹² However, among Jane's four discussion-based courses it is worth noting that her Managing and Administration in Arts courses were only one-credit and only met for 6-weeks (worth about a fourth of the credits of other courses). This means that these were brief discussion-based experiences, and the other two courses within this category were full length and full credit hour designations.

pervasive. Part of this was communicated in the structures of the courses themselves (i.e., lack of meaningful participation by students, no interactions).

Part of how students thought about learning inside of the social sciences was to interact and likely to work with others in the effort of solving society problems and analyzing issues. It is the way the students learned in high school. Students were likely looking for opportunities to interact with professors and classmates in these ways. As Hope described before, the structure of lectures was a culture shock for these students. Jane explained this as well:

coming to the university was kind of a culture shock...it was a little frustrating and eye-opening to know how big it is, and how you really don't have relationships with your professors; it doesn't seem to matter if you go to class or not. (Jane, interview, 6)

This theme of professors not “caring” if students attend class was repeated several times among social science majors. Ryan described of his bioanthropology course, the professor said, “‘you don't have to show up.’ So I guess she didn't really care if you raised your hand or not to answer questions” (Ryan, interview, 4). Hope similarly said, “if you don't go to class, it is literally in the book. And [the professor] didn't care about you coming or not” (Hope, interview, 5). Lack of meaningful interaction attached to lecture courses communicated to students that they did not have to attend and in some ways communicated that the professor did not care about attendance, at least to these students. Although natural science majors would describe that students did not have to attend courses, they did not use words like “professors don't care if you attend.” Social science majors used phrases about caring and concern with their attendance in courses. It may be the case that students majoring in social science are drawn to collaboration and discussion as a part of their learning and expected this structure in their courses. The kind of

participation structures, inquiry, and engagement in social science domains were not foregrounded in the students' courses and seemed to be the expectation that they would be. Overall, they expressed disappointment with lecture formats and a desire for other opportunities for learning and engagement.

Social science courses emphasis on exams. Even inside the social science courses taken by the social science majors, there was still a heavy emphasis on exams. Overall, exams were used to determine about 45% of students' final grades on average. Lecture-based courses were more likely to have heavily weighted exams. Discussion-based courses often did not include exams or were far less weighted within the final grades of the courses. Obviously, those courses with no projects or papers resulted in having a heavier weight on the exams of the courses. 13 of the students' 42 social science courses did not have final or midterm exams – about 30% of the courses. Students still felt the prevalent nature of exams and testing and described these experiences. Mostly students experienced multiple choice, “objective-style” exams in their courses across domains of social science and across institutions. The exams were characterized by rote memorization and very small details being assessed on these exams. In the excerpts that follows the students describe their experiences with these exams.

Jane felt a dominant pattern of exams in her courses, especially in the international relations and economics courses. She said that in microeconomics:

the exam structure was like 50 multiple choice questions, some definitions, like explain what the IMF is, and that stuff. That would be just in terms of vocab. There would be true and false and a few problems directly from our problem sets about exchange rates or currencies or whatever” (Jane, interview, 4).

For her international economics course, Jane said, “the entire class was based off of three exams...exams were essentially a free-for-all between any information that’s even been remotely mentioned...probably 70% from the powerpoint slides and the rest would be current events he went over each week” (Jane, interview, 5).

Similarly, Hope had nine courses of her 12 with exams and these were also her courses that were lecture-based courses. Hope described the nature of the exams within several of her social science courses (psychology, economics, information systems) by explaining the exams, “were usually nothing really strenuous, go over the lecture slides. That was it. It was 50-100 multiple choice for the exams. Maybe a couple other questions. That is your grade” (Hope, interview, 5).

Ryan only had one class without exams; his other 8 courses were dominated by heavily weighted exams. The only course without an exam was also his discussion-based course. The weight of his grade based on exams ranged across his courses:

- 85% in macroeconomic theory
- 80% of final grade in cultural anthropology, and 75% in bioanthropology
- 70% of final grade in microeconomics, macroeconomic theory, and psychology
- 60% in art history
- 25% in macroeconomics

Ryan explained that psychology, economics, art history, grades were mostly based on exams. For example, in art history Ryan described:

They would show us on a huge projector a piece of art. It may be a comparison or you could analyze it. Make sure you say the date and creator. It would be some short answer and some multiple choice (Ryan, interview, 4).

Shyloh had the fewest number of exams among their social science coursework; only 4 of their 11 courses had exams and they were worth about 40 to 50% of the final

grade for these courses. Not surprisingly, Shyloh's experience of exams was largely from their lecture-based courses. In Shyloh's sociology of gender course, they mentioned difficulties and confusion about what to study for this course because Shyloh was uncertain about what was most important and valuable when operating inside of this domain – this was never revealed to Shyloh or made explicit in this course. To study for the exam then, Shyloh reported:

I would just memorize most of the content. I was like, "Ok, I'll memorize the readings and the different theories and different applications and research." But, then I'd get to the exam and the questions were just...really broad. I almost know too much information about them. And then in answering them, I never knew how to do that well either, I would just spit back as much as I could in the space I had. (Shyloh, interview, 5)

Across the institutions and courses, social science majors described similar frustration with exam-based assessment. Students either shared they were easy, as Hope said, "not strenuous" or the exams were incredibly challenging and tested minute details from lecture or reading. Again, the exams were not described as inquiry-based and rarely involved problem solving. Mostly, the exams were characterized by memorization and regurgitation of information. In the next section, I present information about the texts that social science students used in their courses and the purposes for text use.

Texts in social science courses. In the 42 total social science courses, I found that 25 of the courses exclusively or primarily used textbooks as the main source of reading and text. Within the individual courses I also found some examples of additional reading of articles, other books, and popular media or news items. 17 of the courses primarily used professor constructed coursepacks or other books that were very often disciplinary in nature and complex. There were also typically multiple and varied sources within courses

that used an array of texts. I called these collection of texts “non-textbooks” as a shorthand; and, I determined that texts met this category if the texts, novels, books, films, art, would be known to be used as a text within the domain, or if the texts reflect research or commentary about the domain. Of course, depending on how the texts ultimately would be used would render a text disciplinary or not. I kept this consideration open and documented all textbooks and reading on syllabi and documented trends among courses. A list of textbooks and “non-textbooks” that I observed are provided below:

Some of the **textbooks** that were used included:

- Paul Krugman and Robin Wells (2014), *Microeconomics*
- James Gerber (2013), *International Economics*
- Kottak (2010), *Window on Humanities: A concise introduction to anthropology*
- Gazzaniga, Heatherton, and Halpern (2015), *Psychological Science*
- Cowen and Tabarrok (2013), *Modern Principles: Macroeconomics*
- Davies, et al., (2011), *Janson’s History of Art*
- Kimmel (2012), *The Gendered Society*
- Beirne & Messerschmidt (2010), *Criminology*
- Little (2002), *Introduction to Sociology*
- Bovee & Thill (2014), *Business Communication Essentials*
- Wilcox, Cameron, Reber (2013), *Think Public Relations*

Some examples of ‘**non-textbooks**’ that I found were novels, films, articles, current events, primary sources, non-fiction books about specific events and time periods. I did not list shorter articles, but examples of the larger, book length, disciplinary texts, what I am calling ‘non-textbooks’ that were observed included:

- Boyle’s (2005), *Arc of Justice*
- Cassell (2000), *The Woman in the Surgeon’s Body*
- Brautigam (2009), *The Dragon’s Gift: The Real Story of China in Africa*
- Tatum (1997), *Why Are All the Black Kids Sitting Together in the Cafeteria?*
- Kozol (1991), *Savage Inequalities*
- Freire (1968), *Pedagogy of the Oppressed*
- Harvard Business Review articles in economics courses
- Listening to Marketplace and other podcasts about economic issues
- Watson (2010), *Freedom Summer*
- Long (2000), *Religious Freedom and Indian Rights: The case of Oregon v. Smith*

- As noted, there were numerous articles and coursepack readings across courses

As was noted, textbooks were still a fixture in the social science courses, but in contrast to the natural science case presented earlier, social science courses had much more diversity in texts and text-types. Textbooks were often still the primary source of reading and were primarily the sources for exam information, but for other activities like papers, projects, and discussions, students regularly used other reading materials as a part of their courses. In the following excerpts, Ryan and Shyloh explain experiences they had with their textbook reading and with non-textbook reading in their social science courses. These two experiences were representative of what Hope and Jane also experienced in many of their social science courses.

For courses that relied heavily on textbooks, students reported using the textbooks mostly for reading comprehension and for exams and exam preparation. Ryan's description of text use during his second semester of college was representative of other students and also how Ryan reported using texts in the semesters that followed. For example, Ryan said in his economic course: "we had homework most nights in economics...but as far as reading, we would have a couple of reading assignments, that I guess were just for reading comprehension. I think maybe 40% of the grades on our quizzes were reading and answering comprehension questions online" (Ryan, interview, 4). Ryan continued in the same interview to explain the comparison of economics and his psychology course that he was taking at the same time. In an interview exchange, I asked about Ryan's text use as a way to learn new concepts.

Bridget: How did your psychology course run?

Ryan: at the beginning of psych, we focused a lot on biology. Structures of the cell, the brain. It was pretty basic, but I hadn't taken bio since freshman year

of high school...it was a lot of information that I had forgotten and there was new psychology concepts that I had never learned before at all

Bridget: How do you use resources from class to learn or remind yourself of this information?

Ryan: I didn't read. No, I really didn't. The reading was sometimes something I would skim before an exam, but most of my studying came from making note cards that we got to use for the tests. I would only use her lecture notes.

Ryan's description of his use of texts varied from using it for comprehension tests, again another form of memorization, to deciding not to use it when confronted with new information in a course. As has been mentioned before, the function and use of the text is the driver for how students may engage with these materials. There was little reason for Ryan to use texts in meaningful ways in these activities, at least from his perspectives. Other resources (online flashcards) provided the text he needed. This also is reported from a student who possesses robust literacy skills and who could have used the texts if he wanted or needed to.

In a contrasting pattern of text use, social science students reported that some courses required an enormous amount of reading of difficult and dense text. Students encountered difficulty especially when the reading lacked a clear frame or purpose for reading. Students reported difficulties and need for clarification in these instances.

Shyloh's description of reading represented this phenomena across students' courses. Shyloh described that they felt reading was sometimes purposeless and challenging without a frame or reason for the challenge or a reason to "struggle" through the reading:

I feel like, it was a lot of [the classes], I felt like some of them were giving a lot of reading and really hard reading to look impressive, and I was like this is a waste of my time. In my Soc class we had a read a lot of political documents between the US and Iraq during the Iraq war, which were pretty complicated,

and even more complicated at 3 in the morning. I wouldn't mind reading them, I guess I just don't know why we were reading them. That would help me focus on some aspect of them to take important points from a complicated document. (Shyloh, interview, 3)

Shyloh felt this was a "waste of time" because the reading lacked a focus or a purpose.

Shyloh took time to struggle through the reading, even up until 3:00 in the morning reading to understand these texts. Shyloh was certainly persistent and would sustain reading for a long time. The struggle came from a lack of a frame for a problem this text complicated, resolved, constructed; Shyloh was reading without purpose. Shyloh described difficult reading in another social science research course:

We read some really difficult articles....and it would be some journal article about something really obscure, and I would just feel like, wow....I am reading so much with these intense articles and so many words I don't know. And I never had reasons about why we were reading them, or what to look for, or how to read them better. They were just difficult and challenging readings.... And, [the professor] also explained most of them in class, so if I didn't really get it, I was just kind of like, 'ok I give up on this' and then wait for class. (Shyloh, interview, 5)

In another instance, Shyloh explained, it was not difficulty of text, just volume in some courses. Shyloh said, "In my African American History class, it wasn't necessarily hard reading it was just a lot, it would be: 'between Tuesday and Thursday read this 275 pages.' I am not exaggerating" (Shyloh, interview, 3).

Hope reiterated much of Shyloh's experience with difficulty and specialized texts in her social science courses. As a part of this reading, Hope explained some of the strategies that she (and maybe at the request of her professor) used to read this new genre of law, policy, and governmental texts closely. In her public relations and in some political science courses the reading required Hope to "read it so many times...because a lot of the language is so different, it was kind of like reading Shakespeare. So different. Slow down, have to pay

attention to each word; government is always a little confusing to me, but what I learned was how powerful laws and statutes can be and how these can really impact people” (HW, interview, 6). The use of authentic texts allowed Hope the opportunity to engage in reading these texts closely and consider the influence of these on society.

Students in the social sciences experienced a variety of texts across genres, but still used textbooks in the majority of their courses. More important, these proficient readers, explained several instances when they were able to opt out of reading, had difficulty reading, or did not understand why they were reading. Hope provided an instance when productive struggle was observed, but the purpose and intention of the reading seemed clear to her. In an effort to advance disciplinary literacy learning, students should be reading for a purpose or as a part of inquiry, as a way to understand a driving question or background on different topics for an inquiry purpose (e.g., Bain, 2005, 2012; Moje, 2015; NRC, 2005). These details did not seem to translate for the students in their reading in the social sciences; I found that this confusion existed all while students were asked to read an enormous amount each week in their courses.

Papers in social science courses. In the framing of this dissertation, I posited that inquiry, problem frames, and use of texts allows for students’ engagement in the disciplines and domains and advances their practices and skills as they learn *within* disciplines and domains (e.g., Moje, 2015). Inquiry and problem frames position students as engaging in the work of the discipline and allows them access to the disciplinary practices, skills, and approaches to knowledge construction within and across domains.

In the spirit of this argument, the more important consideration about texts is not just what is read, but how the texts are used for different tasks within their social science

domains. Exams have already been explored as it related to students in the social sciences and most exams preparation and use of text occurred with textbooks, homework, and lecture presentations. It was rare that students took exams on 'non-textbook' reading. I had so few examples of this reported that it did not constitute a finding. When students did use disciplinary texts, the texts were more often used in service of paper writing.

In regards to paper writing in social sciences, there are a few points to be made: first, it is worth reminding readers that if students were writing at all – in *any* course in college – it was likely in these courses. The averages and grading trends indicate that social sciences would be the location for any papers and writing that students experienced¹³. Second, in analyzing documents provided to students and in discussing these experiences with the social science majors, many of these assignments lacked inquiry frames, so although students were using texts to write, they were often not sure why or how.

All four students throughout the two years, expressed some instances of confusion, of difficulties, and lack of support when constructing papers for their social science courses. In response, because they recognized that they did not understand the tasks or did not receive sufficient disciplinary tools or scaffolding to engage in this work, students often navigated these assignments through direct work with the professor or teaching assistants to construct scaffolding and disciplinary supports for themselves where it lacked.

As was described previously, about one quarter of students' grades in social science courses were based on paper writing. Although these were a substantial portion of the students' final grades, certainly more so than in the natural sciences, the kinds of paper

¹³ None of the students in this case study took English, except Hope. Students may have had writing in the single humanities course they each took, but again, writing would be limited and constitute one course experience outside of social sciences.

writing ranged significantly from an informal 200-word response paper, to a multi-stage, formal 20-page research paper. Most often, the writing involved analytical essays and the most frequently suggested guidelines were in regards to formatting, a warning not to plagiarize, and a prompt. I found that paper assignments lacked disciplinary tools and scaffolds to support the disciplinary literacy enactment that the assignments often required. These analytical papers were read and critiqued by the professor, or in some contexts more commonly, a teaching assistant and given a grade. In what follows, I outline the experiences students had with papers and projects and document confusion, successes, frustrations, and meaning-making that social science majors experienced had when they navigated this work and sought clarification.

Many of the paper assignments were open-ended and allowed for some choice and students could investigate a topic that was of interest to them. The opportunity for choice was a positive aspect of the work; as was seen in high school, choice allowed students to position themselves within the domains and pursue a topic that they were motivated to learn and investigate. However, the confusion in these assignments came from lack of explanation about choice and how one might pursue these topics. The following excerpts chronicle the students' experiences in their social science courses and the ways they navigated the lack of disciplinary tools and supports by demanding clarity from professors and teaching assistants. There were overlapping experiences among the students and their writing endeavors, and for the sake of clarity I will present the dominant experience of each student through their own coursework. At the end of the section, I will describe overarching experiences of writing among the social science majors.

Shyloh had the most writing and paper assignments among their courses in social sciences. All but one of their 11 social science courses had writing as a part of the course grade. Paper assignments length, inquiry frame, and requirements ranged across courses. Although Shyloh's case is not representative of what all the other students experienced in their writing, a more detailed analysis of Shyloh's experience can give a glimpse into the most robust experience of writing within social sciences. Shyloh's experience may illustrate the more frequent and diversity in writing genres that a student may experience in the social sciences. A brief summary of Shyloh's courses and assignments is provided here:

- Introduction to Sociology: a final paper, worth 30% of the course grade.
- African American studies course: a 5-page essay, worth 20% of the course grade.
- Honors social science writing and research: flexible and self-directed course. Writing and reading involved. Shyloh reported confusion about the nature of this course and how to get something out of it.
- Understanding Power and Knowledge: an analytical paper, a "reverse engineering" of a text, archival research, assessing ethnography, quantitative analysis paper. These papers comprised 60% of the final grade.
- Group Dynamics and Relations: final paper that comprised 50% of the course grade.
- Social work: semester long project and reflection writing, worth 70% of the course grade.
- Sociology of Gender: 2 analytical papers that comprised 40% of the course grade.
- Sexuality Studies: interim writing about text and a final paper about a topic in the course. This was the entirety of the course grade.
- Criminology: two short response papers worth 35% of the grade
- Social Theory and Social Change: Annotated bibliography worth 60% of the course grade.

To better understand Shyloh's experience with writing in social science courses, I provide some of their experiences in what follows. Shyloh provided details about the Group Dynamics and Relations course and explained the most significant writing assignment for the course. This paper prompt and the navigation of it represented a theme of confusion about the kind of writing and the approach to writing in some social science courses among these majors. Shyloh reported:

we had this one paper where we had to go to two campus events about social identity and write about them. But literally the prompt, the only thing it said was, 'Synthesize your learning. Write a four to five page paper.' And I'm like, 'What does that mean? Everything I've ever written has synthesized my learning.' (Shyloh, interview, 4)

In the face of her confusion, Shyloh emailed the professor and that did not provide a lot of help in clarifying, scaffolding, or providing some tools to know how to approach writing to the prompt; the course professor wrote back and stated (in Shyloh's recollection), "I am a very strong believer in not giving very structured papers because I think that not a lot of learning occurs in structured papers." Shyloh explained:

I understand [the professor's response], but also telling us to 'synthesize our learning' is meaningless...and the thing was so also graded a bunch of people down really harshly on that paper because they did more of like a person reflection paper on the events and not really a theory paper. But, again, she didn't say to do that or to incorporate theory or talk about things we had discussed in class. (Shyloh, interview, 4)

In advocating for their own understanding and approaches to writing, Shyloh and some classmates discussed writing individually with the professor of this same course:

After that, I met with her in office hours and a couple of us in class actually asked to give us more specific prompts because it was so confusing. The final paper prompt made a bit more sense (Shyloh, interview, 4).

Shyloh and their classmates had high standards for their writing, which may have perpetuated this confusion or request for clarification as well. In high school, students engaged in writing that was bound to the discipline itself and was driven by rather explicit disciplinary literacy practices within this writing. The prompts and writing practices that one might engage in within the college social science domains were less clear and made less explicit. In this instance, I referenced the syllabus and the course prompt for this paper. In fact, the paper prompt stated, "prepare a 5-page paper synthesizing your learning about the impact of the event topics on your own life and their relevance to the course topic." This

prompt was the only material provided for the paper writing endeavor, but the prompt did mention linking the event to a course topic. It does not, however, describe how one might synthesize your learning from the event and then relate to your life and a course theme. Shyloh and their classmates were searching for information about how to engage in this writing, but were not given scaffolding, disciplinary tools or clarity on how to do this. This confusion occurred in regard to the prompt and expectations of the paper and writing endeavor. In other instances, students experienced a mismatch about expectations and about expectations regarding outcomes of the writing endeavor, when their expectations exceeded those of the writing outcomes.

Working on a project with a group, Shyloh described an instance when their expectations seemed to be higher than those of the professor. Additionally, the lack of feedback for how to improve based on this writing (that was below Shyloh's expectations) became another source of difficulty. Describing the issues with the paper, Shyloh explained:

the problem was that, yes, we had a thesis statement, but it wasn't really arguing anything. It was not analytical or an argumentative research paper in the slightest. I had to edit a lot of the paper when people put in their sections. It was 20 pages long, and I was thinking I am expecting to barely pass this assignment. The feedback was "Great job, 95." And I was like, "did you read it?" (Shyloh, interview, 4).

Shyloh's experience in this course included having opportunities for writing and for using texts. The approaches to writing, the expected outcomes, and the visibility of the writing practices she is seeking to improve remained implicit and tacit. The feedback (or lack of feedback) on the papers was also communicating something to Shyloh, which was as they described, to "learn how to include less detail and spend less time on my writing. I really spent a lot of time, but I am not sure that I needed to do this all the time. It didn't seem to matter or pay off" (Shyloh, interview, 5). The main issue of these writing endeavors is that

the problem frame or purpose for writing was rarely revealed to students. In the Group Relations paper, the syllabus explains “because we are studying identities and the context in which we understand social identities, a greater understanding about social identity becomes a good way to critically analyze oppression and privilege” through writing and responses. If the writing should allow this exploration, students need support to know how and in what ways to critically analyze oppression and privilege. Shyloh indicated that she enjoyed discussing these topics, but was never certain the purpose or approaches she should use in the writing endeavors.

The understanding of purpose, the problem frame, and the approach to writing seemed much clearer to Shyloh in high school. In one instance, Shyloh described working on a research paper for a course, and although she felt able to complete the project, they felt it was not a result of the course instruction, but rather instruction from high school about writing. Shyloh explained:

If I had not had the kind of teaching of writing in different classes in high school, I don't know what I would have done. I saw other students struggling with it because they had never written this kind of thing before, and we didn't get direction on how to approach a very big assignment. A 15 page research paper is a big assignment. Luckily, I had done it before” (Shyloh, interview, 5).

For Shyloh, who experienced the most amount of writing in their social science coursework, the pattern that emerged across the courses, the prompts, and the assignments, was the lack of disciplinary tools and scaffolds to support students' engagement in the writing. Without sufficient tools or discussions of language use and literacies within domains, these practices remain tacit and students approach them using their own resources and background knowledge. As Shyloh explained, they had to rely on having complete a research project in high school before and then enacted the skill they

gained there to this context. Shyloh felt comfortable with this assignment, but classmates seemed to need more scaffolding. I wonder, too, how Shyloh may have been able to be pushed in this writing endeavor to consider things in even more disciplinary ways, instead of approaching this assignment independently. Without appropriate scaffolds, supports and disciplinary tools, students may be less likely to advance their writing skills within domains over time and may only improve them (or fail to improve them) through trial and error approaches. Further, it may have been that some writing assignments were only for developing thinking and not for practicing writing practices in the discipline; this kind of transparency of purpose is important for supporting students' understandings of why they are engaging in the endeavor. Shyloh experienced literature reviews, analytical essays, response papers, research projects which are all rich examples of disciplinary writing and communicating in the social sciences. Shyloh reported using a variety of texts in their work as well. The issue was not the use of texts and writing prompts, but the lack of a problem frame, inquiry, or instruction about disciplinary literacy and language that one may use to engage in this writing. Further, Shyloh attempted the writing assignments and had high expectations for their writing; but, the feedback was sparse and did not reflect the capabilities that Shyloh possessed. Even if disciplinary tools lacked from the outset of the assignment, the feedback may have been the place to communicate some of the tacit moves and approaches to writing within domains. Shyloh summarized their experience well by saying:

I just always feel confused when I get an assignment. In high school, I had a very, very good idea of how that sort of stuff was going to be graded and how I achieved those goals. If you didn't do certain things, like not have thesis, you would automatically fail. We had high standards...but, apparently in college, you can turn in this paper with questionable citations and basically no thesis and be like 'Great job!' (Shyloh, interview, 5).

Shyloh's statement illustrated that something shifted between high school and college for these students. Shyloh had a sense of confusion, but also was succeeding on the paper assignments. Might it be the case that the purpose and problem frames were not well elaborated? Without such elaboration, the indications of quality of disciplinary writing may not be developed even among the instructors? Shyloh needed more feedback and support about how to improve, despite her developed literacy skills. And, feelings of clarity and purpose are important for driving meaning-making and inquiry using texts and complex concepts. In the next section, I briefly describe writing experiences among Ryan, Jane, and Hope in their courses.

Ryan experienced similar confusion to Shyloh in regards to the lack of clarity of purpose, lack of disciplinary tools for writing, and lack of understanding of approaches to writing across domains. When asking Ryan about his research paper in cultural anthropology, he reported that his professor "gave us no guidelines on that. He said, 'pick something that you're interested in and write about it in the context of anthropology.' And it is like, alright?" (Ryan, interview, 6). I checked the syllabus and other materials from the class and the only reference to the paper was the description of a research paper on the syllabus "of the students' choosing." When I asked him how he knew how to write in anthropology and how it was similar or different to other domains, Ryan explained that he tried to "write more about people." In describing the topic he chose, Ryan explained, "I just wrote about Mayan civilization and how they interacted with astronomy. And how that kind of compares to what we know and how we use astronomy now" (Ryan, interview, 6). In reading and analyzing Ryan's paper, the completed paper was in the style of a report

with facts about the civilization from multiple sources and organized by themes about astronomy and developments and how we use many of the developments today. The paper did not include an argument about the topic, with the exception of supporting claims that we use Mayan developments today. Ryan said, “the whole paper was very vague, very vague. I ended up with a 96 on that. I am convinced he didn’t read all of it” (Ryan, interview, 6). Again, Ryan experienced a lack of clarity on how to pursue an anthropological paper; although, in the analysis of the paper and giving the feedback, it may have been the case that the professor wanted a report-style paper on a topic. Feedback, similarly to Shyloh’s difficulty, seemed to lack about how to improve writing and what quality writing within a domain truly looks like (and how students might develop these skills).

Jane brought up another issue related to writing and challenge of writing in social science courses. Jane described that writing in some of her courses did not necessarily challenge them or advance their skills, and in other instances, she would feel challenged in her writing but did not receive adequate feedback to know how to improve. Jane indicated:

analytical paper writing like I am doing for my classes comes easily to me. A long essay I can do in a day. And short responses that I have in a lot of my classes, 250 words, that would take 15-20 minutes. These are easy for me. (Jane, interview, 3)

In contrast to the papers that were “easy” for Jane, in her African American studies course, Jane explained that her final paper was a genre that she had not done before:

...an annotated bibliography which was like 13 to 15 pages. I wasn’t totally sure what I was doing, but I needed to finish that before my other exams. So I worked on it all within like one day at the library from noon until 9am the next day. We never saw an example of this, so I just did the best I could” (Jane, interview, 4).

In the less familiar genre of an annotated bibliography, Jane described how she navigated this challenge. She said she did not attend office hours, but did email specific questions to the professor only after she had researched different models of annotated bibliographies online. With examples in hand, she emailed her professor asking about structure, approaches, tone, and the need to hone or refine sources. As Jane described, “I just did the best I could” and she turned it in. She was eager to hear feedback about how she approached the assignment, and Jane said that they turned it in as a final and got grades online, but never received written feedback or anything specific about her paper with the exception of the grade. She told me this was a pattern she noticed; “in college, you don’t get a whole lot of feedback, you just keep going and hoping that you are on the right track. You want to hope the class is pretty straight forward, or things you have done before” (Jane, interview, 5).

For Jane, analytical paper writing and tasks were familiar and routine. She did encounter some new genres like annotated bibliographies. However, her conclusions were that feedback was not common or helpful in college writing. She indicated that when you are confused you should seek out answers, or hope that you have enough background knowledge to navigate the tasks. When I asked her what she thought about her writing or changes in her writing since college, Jane stated, “I’d say...in terms of learning, I haven’t learned a lot about paper writing in university. It’s mostly just the length that’s increased and each teacher is different in how they feel about you regurgitating information, versus summarizing sources, versus it being your particular opinion. I think each teacher probably thinks about it differently, but that isn’t really made known to us. I don’t think I am continuing in any consistent way of growing in my writing” (Jane, interview, 5). Jane

described the way that most disciplinary literacy skills remained tacit in her courses because as she described “I think each teacher probably thinks about it differently, but that isn’t really made known to us.” College learning, writing, and literacy does not seem to be conceptualized as including students in the practices of domains in robust and meaningful ways. Writing in the social sciences, like lab-based activities in natural sciences, seemed to be used for procedural, completion, and participation, but not as a vehicle for advancing disciplinary literacy skills and apprentices in these domains.

In a last example, Hope described the experiences across 5 courses that included writing as a part of her coursework over two years. In these courses, Hope reported a range of successes, challenges, and confusions. When I asked about her biggest success from the semester, Hope told me about a writing assignment in her African American studies course.

She explained:

...the class was the easiest in the world. Writing for that class was so easy. But, I think it was when I felt most grateful for my high school background. He was the perfect mix of [teacher name] and [teacher name] put together, in terms of their thought process. No one else in the class really understood. I think everyone else thought it was random, but it wasn’t. I felt so prepared, like I was in [my high school] classroom. The papers were like 6 to 8 pages but they were a breeze for me” (Hope, interview, 3).

In this course, Hope felt confident about her writing. In analyzing the writing prompts, the course required her to write analytical essays about novels they had read for the course. This activity was very similar to activities from high school, so it was true that Hope had experience in this kind of writing. However, when I evaluated more of the materials and presentations from class, I did not find many disciplinary supports for writing. I also asked Hope if this teacher described how to approach writing during the course lectures and discussions, and she said not really except for they analyzed passages together. In this way,

I think the teacher likely used a model from the class to serve as the approach to analyzing in writing. This transition from discussion to writing is not always easy without scaffolding and support, and my sense is without high school experience in analytical writing, this may have been more of a challenge for other students in her class.

Once she entered some business course that involved writing, Hope faced more confusion in her assignments. In one integrated business courses, Hope explained that the professor would “give us projects and assignments, and not tell us how to do them. Then we would turn them in and they would be wrong, and she wouldn't explain why they were wrong. She wouldn't help me go back over it. I was so happy to just get a B in that class” (Hope, interview, 3). Within a domain new to her, the practices held within the disciplinary community are less clear to Hope. The feedback that was provided also illustrated that writing “would be wrong” but Hope was not sure how to improve her writing within this context. The project that Hope was most frustrated by was a business plan project based on the local community where her college was located. She was to write a business plan for a cleaning company. The assignment prompt provided an outline of a business plan but gave very limited information within each category. The categories included, “summary, strength/weakness analysis, threats, marketing strategy, competition, differentiation, method of distribution, management and structure of company.” The final business plan was about 5 pages long and described different aspects of these categories. Hope described that her textbook did not use the same language as the business plan (she was particularly confused by “threats” and being similar or different to competition) and so she struggled to navigate this when she felt she did not gain beneficial information from her professor.

During one interview, Hope reflected about college writing and tasks and expressed that the difference was not having a lot of support in college for your work. Hope said:

[in college] with research, projects, and papers, no one gave...specific instructions. It would be an umbrella, like write about whatever you want inside of 'education' for example. Bring whatever you want into it. Tie it in however you want. It just needs to be about education, and be 7 pages long, and don't plagiarize. That is about all you get. That is so different from high school, where we had choice, but also had support with big projects and papers" (Hope, interview, 6).

Hope recognized the opportunities for choice in her social science writing, but also felt the confusion and lack of support when the large projects did not include disciplinary tools or scaffolds. In high school, Hope described that these writing projects had "support with big projects and papers" and in college there are "no specific instructions." Imagine the experience of a student without the writing background that Hope had in high school attempting to navigate these difficulties.

As these exemplars illustrate, all four social science majors experienced successes, challenges, and difficulties in navigating the writing assignments in their social science courses. When they were faced with this confusion, students reported relying on their background knowledge and literacy skills largely developed in high school and navigated this confusion by seeking out information from professors. Each experienced some confusion about how to approach assignments, the purpose of writing, and what constitutes quality writing within (and across) domains, all of which seemed to result from a lack of disciplinary tools, scaffolds, and models of writing within and across domains. The paper assignments, though attempting to target disciplinary learning, writing, and thinking, often did not include disciplinary tools or scaffolding that supported students to engage deeply in this work. Instead, the assignment assumed that students could engage in this

work seemingly independently, and without the revealing of often tacit practices and ideas within the discipline and domains visible. Some writing assignments were confusing because they lacked an inquiry frame and students were not certain the purpose for writing in some courses. Feedback on writing approaches, quality, and the tacit language practices within domains was lacking, and in some cases, non-existent. In several instances, the writing assignments held much potential for positioning students toward disciplinary inquiry in the social sciences, including analysis projects, “reverse engineering” of arguments, and literature reviews, which represent genres or activities to investigate genres within the social sciences. However, without appropriate disciplinary tools for writing or the necessary scaffolding of disciplinary literacy practices, the result was students feeling as if they were not gaining significant skill in writing, and they were feeling this way within the specific domains in which they were specializing and majoring. It seemed that students’ writing became an exercise in futility. To underscore, writing was still a rare occurrence in college across courses; among those in this study, if students were to encounter writing at all, it was likely in social science courses (and in the one or two English or humanities courses students took). Although this case study took a close look at the writing that happened within social science courses, it should not communicate that this writing was necessarily commonplace.

Natural Science and Social Science Cases and Disconfirming Cases in other Domains

The students in this study were beginning to specialize and pursue majors as early as their freshman year. As they engaged in more and more courses in their domains, the dominant structures and attributes, particularly related to assessments, texts, and tasks,

across natural science and social science courses became more visible. Across social science and natural sciences, courses were dominated by exams, textbook reading, and lecture. Natural science students experienced the “highest stakes” exams, “telling” or lecture teaching approach, and less opportunities for student-centered disciplinary inquiry. Social science students also engaged in exams and lecture-oriented teaching, but experienced more opportunities for some inquiry work, in the form of paper writing. These realities may have been different had students majored in different subject matter or took different courses through college. Because students took such few English and humanities courses, it is difficult to assess the disciplinary framing that did or did not exist within these domains. However, as a pattern of experiences in Chapter VI will illustrate, students had to navigate and clarify the papers, tasks, reading, and projects that occurred across almost all of their courses. This seems to indicate that on the whole, students experienced projects, papers, assignments, texts that lacked framing around disciplinary purposes. Students were often confused about why they were engaging in different tasks, how to navigate the expectations, and what skills and approaches they should use for successful engagement. Students brought disciplinary literacy practices and skills with them to college from high school; however, they were not independent disciplinarians and still required disciplinary tools and scaffolds to advance and support their engagement. In their senior years of high school, they needed scaffolding and support to engage in disciplinary literacy and inquiry activities. They would need similar scaffolds early in college as they continued to refine and advance these skills. However, the reverse seemed to occur – disciplinary practices within natural sciences and social sciences became entirely tacit upon entering college and inquiry

frames were lacking. Readiness does not mean independence, but rather “ready” to advance skills within the domains students seek to participate, specialize, and join.

In her interview, Jane expressed the reality of college learning in better ways than I can likely explain. Jane said:

there are a lot of classes you take without themes. Like you don't know what the purpose of the course it and what you are supposed to be doing within the course. It's really difficult to have themes. My international studies course and my Spanish course did the best job of that kind of holistic thinking because they both had themes. They both had a mentality we were supposed to keep while reading our pieces. Or just kind of a phrase or framework that we were viewing all of this with it...I definitely think that we had that framework in our classes in high school, and that is an important thing to keep. It will help students retain information. Like even in us talking about this, I can tell you about what I did in my chemistry class in high school, I can tell you about political philosophy in high school, and I can tell you about what I did in international studies and Spanish in college because it was thought-provoking and there was...a thesis to those classes. When it is isolated information, and no frame, I just compartmentalize, memorize, take a test and throw it out the window. (Jane, interview, 5).

As Jane describes, a theme, a frame, a purpose for learning— including the purposes for inquiry and knowledge construction in domains—provides a “mentality” that students keep in mind as they read, write, think, and analyze and as discourses are revealed and not tacit (e.g., Gee, 1990). The inquiry frame available to courses can be driven by the problems that guide the disciplines or domains the problem(s) that the course seeks to investigate together (e.g., Lee, 2004; Moje, 2008; Shanahan & Shanahan, 2008). Inquiry and constructing knowledge within a problem frame can be a driving force of organization of knowledge within a course and over time (e.g., Moje, 2015, NRC, 2000, 2005).

In analyzing other courses—including English and humanities courses—I found a few examples of courses that organized learning within disciplinary inquiry frameworks (in ways that I did not observe in the natural science and social science courses). One

representative example of these disconfirming cases was from Erin who took an interdisciplinary and humanities course on “Islamic Origins.” During our interview to discuss her semester, Erin was able to recount the knowledge structures in great detail within the scholarly community regarding the origins of Islamic faith structures and histories (a community in which she admittedly had no background knowledge). She was able to reiterate the debates, historical evidence, religious beliefs, authors, schools of thought, and other drivers that influenced the scholars within the Islamic origins domain. Not surprisingly, this course was organized through driving questions that provided structure to readings, text use, discussions, and the projects in the course. It was interactive and included a variety of supports for students to access and interpret the sometimes veiled arguments within this domain, such as reading guides, vocabulary discussions in context of readings, interpretation held in discussion and online. As Erin described the course was about:

looking at the arguments about how Islam originated. And so they ... Which it was really interesting and it was a lot more learning about like, what makes a good argument? It was more looking at, this is this person's argument. Here's their evidence. This is another person's argument, here's their evidence. What do they have backing up? The evidence that they're claiming. It was looking really in depth about how people structured their arguments and what makes good evidence, and what makes not good evidence (Erin, interview, 2).

This kind of course structure was rarely observed in natural science and social science courses. Learning the detailed arguments and approaches to intellectual communities and domains was not foregrounded in domains. What this structure allowed was the organization and purpose for engagement in different activities. When compared with the descriptions of natural science and social science courses, the differences in the framing, access to inquiry, and structures of the courses are disciplinary and practice-oriented. This

example, and Jane's argument about learning within frameworks of a domain, can provide at least early examples of how courses can be structured, assessed, and advanced across domains.

Without the intellectual purpose in learning, exams, lectures, discussions can feel like disjointed and disconnected activities. Although there were a great many differences provided through this chapter, the presence of inquiry frames in high school and majority of courses lacking an inquiry frame in college at the course level, at the task level, at the reading level resulted in students' confusion and frustration. What we know of learning and in most conceptions of learning, engagement, inquiry, exploration, apprenticeship, problem solving, and construction and production of knowledge become key drivers to deep learning (e.g., Donovan, Brown, & Pellegrino, 1999). If these students, privileged, well-prepared, armed with specialized literacy skills, and with every marker of college readiness felt confused, felt unsupported, or were unclear about the value of learning activities in college, what of the students with fewer supports, skills, and experiences?

Conclusions

Across the majority of their courses, these students (and, presumably, the others who took courses with them) experienced a large amount of exam-based assessment and fewer opportunities for inquiry in their college courses during the first two years. Within their major area courses, social science and natural science majors experienced didactic approaches to teaching and learning once arriving on college campuses, which emphasized textbook reading, frequently memorizing material, attending lectures, and taking exams. This stood in stark contrast to the disciplinary literacy learning and inquiry experiences that they experienced across domains in their high school. These findings revealed

important patterns about the teaching and learning happening within natural sciences and social sciences, which were the majors that 8 of the students in this study sought to specialize; students within these domains were not often positioned as apprentices into the domains, but rather as passive recipients of information about the domains. To be sure, these experiences may have differed within other majors or pathways in college, although there are some indications that exam-based assessment was a common feature across most courses and majors; for example, the domains of mathematics and world languages had the largest assessment percentages as exams. In English and humanities, students may have still experienced exams, but would have likely experienced more paper writing and projects and would likely be the exception to exams as the primary assessment tool (as noted in the disconfirming case observed in the Islamic Origins course). Overall, students reported fewer opportunities for extended inquiry, investigation, projects, and writing across courses. In the next chapter, I present findings about the ways that students navigated confusions and how they constructed their own disciplinary experiences to gain more expertise in domains that was provided by their college experiences.

CHAPTER VI

Students Navigating and Constructing Disciplinary Experiences in College and Beyond

The intention of this research study was to capture the learning and literacy experiences of a group of well-prepared, “college ready” students. I pursued these questions as a way to offer insights into how high school can prepare students for college work. What I found, however, told a different story entirely. It seemed that, more often than I thought would be the case, students had more disciplinary, more scaffolded, and richer learning opportunities in high school than in their college contexts. When disciplinary engagement opportunities were offered, as was sometimes the case in the social science students’ writing experiences in college, students received little support through disciplinary tools or scaffolding to support their writing, reading, or literacy skills. Conversely, students reported experiencing disciplinary opportunities that were so proceduralized and prescriptive, as was the case in many natural science lab experiences, that students experienced boredom and repetition.

In essence, these eleven college-ready students possessed many of the skills we would hope our graduating high schoolers would possess, but were not met with the appropriate instruction for their skills. And, if professors did not meet these students at their appropriate skill level with supports and scaffolding, it is likely they did not support other students who were less prepared in disciplinary learning and literacy. What about students who might need even more support through disciplinary tools and scaffolding

within domains they have not engaged before? So again, what were these students ready for, and what were they met with once they arrived in college?

To end the story at this place would be insufficient, as the students in this study behaved in particular ways when they were confronted with these lackluster or confusing learning experiences in college. The ways in which the students responded to the experiences provides additional findings related to students' abilities with *navigation* and *agency*. As described in the framing of this dissertation, navigation refers to the ability and skills of students to engage in various domains and contexts as well as across them using their navigation strategically "as agents who decide how they want to be recognized or positioned" (Moje, 2013). Agency can be understood as, using Moje and Lewis' (2007) definition, "the strategic making and remaking of selves, identities, activities, relationships, cultural tools and resources, and histories, as embedded within relations of power. At times, but not always, the relations of power themselves are disrupted and re-made" (p. 8). Agency is the active engagement and skills necessary to advocate for oneself across various contexts, which requires skills of navigation in order to advocate with flexibility.

As Moje (2013) linked agency and navigation, social and cultural capital and privilege are tools, skills, and power that people used to enact agent and navigating into their experiences. Agency and privilege have connections to the social and cultural world and also shape how people interact within various spaces, but privilege in particular means how and when people leverage different capitals in different social spaces (in the Bourdieusian sense) for their own benefit (e.g., Maxwell & Aggleton, 2013; Davey, 2012; Stevens, 2009). I do not mean to imply that privilege is a purely pejorative term and that these students believed themselves more worthy of information than others—quite the

contrary. Students' sense of privilege was toward their own learning and sense that academic spaces are places of clarity and purpose, and so navigating these spaces as agents of their own learning was a practice developed and fostered in high school (and likely earlier). Agency, privilege, and navigation serve as constructs to interpret the ways that students move among the various courses, requirements, tasks, and academic spaces of college learning.

In this chapter, I explore three related questions: in what ways did students navigate the learning experiences of college and, in particular, how did they navigate those challenges and points of confusion that students faced in their courses? How did some students navigate the larger institutional structures of college and act agentially about their own learning? And, how did students navigate and construct their own disciplinary experiences when the experiences within the university fell short of their learning goals? These questions point to the sense of privilege, or leveraging social and cultural capital for personal benefit, and the ways students acted as agents for their own learning which illustrated how students enacted this privilege for their own learning. These were each prompted when students experienced as sense of confusion and difficulty in academic tasks and sought information and insights into how to successfully engage in various projects.

In previous chapters, I presented early indicators of potential answers to these questions, specifically as it related to ways that students advocated for themselves and requested clarity, additional supports, disciplinary tools, and scaffolding on assignments when the supports were lacking or confusing. In this chapter, I present findings of ways

these eleven students navigated the academic demands and experiences of college in agentic ways. These findings are presented in three parts:

- (1) First, I present findings about the ways students used the structure of office hours to navigate individual courses and request clarity and support on academic tasks and texts of college. The use of office hours included meeting for clarification on assignments, discussing and interpreting content, monitoring learning and course grades.
- (2) Second, I present a case study about the ways three students who ultimately took “alternative paths” through college navigated or struggled to navigate their institutional structures of college, which eventually meant that three students—Cassie, Jennifer, and Michelle—each of whom left their respective institutions.
- (3) Third, I present findings about the ways students used their agency to construct extra- and co-curricular experiences for themselves to learn about the disciplines and domains they desired to enter. These experiences were pursued because students felt they needed to develop more domain-specific and specialized skills and practices than what college coursework alone afforded them.

The chapter concludes with final thoughts of students about what advice they offer for other students as it relates to navigating and being “ready” for college. The findings throughout this chapter were shared with me almost exclusively during interviews. At times, daily diaries were used to triangulate findings related to how students reported using time and the ways they used resources in college. Also, these data were not necessarily findings I predicted to have as a result of this study. I was enormously surprised that three of eleven college-ready students chose to leave higher education institutions for various reasons. However, their personal stories provide insights into the ways that college might better support students within institutions, and the ways that students used their agency to act in their own interests to navigate and understand the structures of college.

Navigating courses: The use of office hours

The eleven students in this study possessed the *expectation* that they should understand the content, papers, and projects that are a part of their academic experiences. To be sure, this expectation (and privilege) likely arose from academic identities that students developed in high school (and likely before high school) and the access to disciplinary tools and scaffolding that was regularly used to support them in their learning, as was described in Chapter Four. The eleven students did not accept instances when they were confused, uncertain, or unsatisfied with their engagement in their academic tasks and texts. When they encountered this confusion, students sought clarity, advice, additional knowledge, and information to monitor their own understanding, learning, and performance in their college coursework – things they did not receive unless they sought it out independently. These actions speak to the eleven students' feelings of social capital, social privilege, and agency that there should be clarity and purpose described in their learning, and if they did not experience this they sought it out.

Interview data also showed the ways in which students were savvy about the information they knew and described about their professors and teaching assistants. Regularly, students described the academic background of their professors, where they attended school, what their specialization was, and their academic interests. It seemed that students took care in learning about their professors as a part of developing a relationship with them. Several students also described specific ways and reasons they approached professors or teaching assistants about information or clarification. Of course, not all classes had teaching assistants, but when they did, several students described meeting with teaching assistants for clarification on papers and projects because they believed the

teaching assistants would ultimately be the ones grading the assignment. Shyloh described in their social science writing course that they “always went to the professor because the TA always ended up just asking the professor [about the questions] anyway.” But in another one of their courses, Shyloh reported meeting with the TA because it was a nice “buffer zone” between an unavailable professor and the course (Shyloh, interview, 5). Jessica reported in her chemistry courses, that students learned “you do not talk to [Professor]. You go to [teaching assistant]. He is very nice and helpful” (Jessica, interview, 3).

Possessing knowledge about their professors and as they encountered a need, all eleven students reported regularly attending office hours with their professors and teaching assistants. It was the exception when students reported not attending office hours with a professor for a given class at some point in the semester. Most often, students would explain each semester that they had met with all of the professors or teaching assistants at least a few times, if not regularly during the academic term. Of course, as needed, students also conducted communication over email with professors for clarification on assignments or for discussing grades or content, but only when office hours were not available to them. Students reported attended office hours for three main purposes: (a) clarification of assignments and studying for exams; (b) discussing and interpreting content; and, (c) monitoring learning and course grades. I claim and illustrate in what follows that students meeting with professors in-person was because students desired dialogue with professors (and not only email) when describing difficult topics like clarification of topics, content, and grades. Students likely felt able to do engage in discussion and dialogue with professors

because of a sense of agency, social and cultural capital, and privilege, particularly in academic spaces and regarding learning.

Clarification of assignments and studying for exams

I found two patterns regarding how students in this study met with professors about clarification in their academic work. One purpose for meeting was for clarification on papers and projects when students lacked sufficient or adequate scaffolding and guidelines in these endeavors. The second purpose for meeting was to clarify and affirm what to study in preparation for exams that students so frequently took.

Clarification of assignments. Throughout all of his interviews, Ryan emphasized his regular attendance at office hours to meet with professors for various purposes. He met with professors frequently to clarify assignments and projects. It should be noted again as a reminder, Ryan had the least amount of required writing among the social science majors. However, when he did have a writing assignment, he regularly sought advice and support in navigating these assignments from professors. Ryan reported meeting with his Ethics course professor for assistance with writing projects that were a part of the class. In these meetings, Ryan discussed the assignments in the course and his confusion with writing a research paper that also included philosophy-based explanations: “in Ethics, I met with him about the research paper because we didn’t have a lot of guidance...[the partner on the project] went with me and we were in there for over an hour discussing ideas and approaches” (Ryan, interview, 5). In another one of his courses, macroeconomic theory, Ryan reported meeting with the professor about a paper, again because it lacked much guidance, and he wanted to “make sure my topic was valid, since he had given us zero input” and the professor said, “yeah it sounds great.” Ryan smiled a little and admitted, he

thought this feedback was the result of the professor “having a lot on his plate in terms of classes. I think he was fast with his grading – not sure that he really cared about what I wrote about” (Ryan, interview, 6).

In another assignment, an extended project for his environmental studies course, Ryan described that the project involved some choice on a topic within water consumption; Ryan and his group decided to focus on water consumption on college athletics fields and the benefits of turf versus grass fields. On this project, Ryan and his group collected some data from “people at the athletic centers to see how much water was used and pesticides and all of that. How much maintenance really needed for a turf field. Ultimately the project was an online poster that we printed out to present. Then we wrote a paper” (Ryan, interview, 4). Throughout the planning of the project, Ryan met with his professor to clarify the scope of the assignment and the resources that were recommended to be used. Ryan also described that he specifically reached out to the professor about what to write the paper about, because as Ryan explained, he did not think that “it should be word-for-word what I would present.” In speaking with his professor, he found out that the paper should be about “how you went about...I don’t know...conducting the project I bet, and less about what was actually found. I don’t know it was confusing. She actually had to send multiple emails to the whole class trying to clarify. In the end, I think I did a little of both – information of what we found and the process. I don’t know if it was what she thought it was supposed to be” (Ryan, interview, 4). Ryan’s discussions with the professor likely prompted the clarification emails to the entire class. In meeting with the professor, Ryan was able to discuss his idea as well as receive literacy support and information about what should be included in the paper that accompanied the presentation.

Students often met with professors when they encountered a new genre or new kind of writing in their coursework or as a part of projects. Shyloh reported that in class they asked for clarification about if a literature review “has a thesis statement” and from their discussion with the professor in class they concluded that it should not have an argument, but this new genre was confusing to them. Shyloh explained that they “went to her office hours...and mostly just asked her ‘what am I supposed to be doing?’” (Shyloh, interview, 5). In another course, a course on philosophy and reasoning, Shyloh reported meeting “with my [TA] during office hours a lot. In the beginning, I did it because I didn’t know how to write philosophy, like how do I do this? That is helpful because he would look at my writing and say ‘yes, this is philosophy, or, no, this isn’t philosophy.’ It was nice to show him drafts of my writing to understand that better” (Shyloh, interview, 4). New genres of writing prompted students to inquire and have conversations with the professors in their courses about approaches to writing. Students advocated for their understanding and also recognized their lack of knowledge and familiarity of particular genres, especially within domains new to them.

Jane reported reaching out to her Spanish professor about essay prompts and to navigate the intention of the essay assignments. Jane explained that prompts themselves were general in nature, and this was contrasted when the grade and feedback seemed to be looking for something much more specific. the grading and feedback was looking for something much more specific than she initially realized. After earning low grades on a few paper responses, she met with her professor to clarify:

Jane: For my Spanish class, once every week or two I'd just pop in to ask about the essay prompts I was writing. I ended up doing that a lot more

towards the end of the semester because I realized that even though they're asking really cool prompts, they pretty much want one answer.

Bridget: Oh, and you found that out in office hours?

Jane: Yeah. (Jane, interview, 3)

Extended writing assignments within courses meant students met with course professors in an attempt to clarify the directions and approaches to writing. As a part of one of her first writing assignments in college, Hope reported meeting with her African American Studies professor about an essay; she explained, "I met about my research paper because he was not very clear about what to do....I met with him and told him my idea, and he was going over other stuff that could work and other pieces of the book I could use. That was really, really helpful" (Hope, interview, 3). Similarly, Jennifer explained, for her English class, "I went to office hours a lot...to see if I was on the right track [to writing essays]. When I went, I would pitch my ideas, and then his essay prompts were usually kind of weird. So, I'd make sure with him that [my essay topic] was on the right guidelines of what he wanted. The prompts were weird, like asking us to 'Analyze this text with your life'...I mean, I don't know exactly how to do that. So I had to go ask" (Jennifer, interview, 3).

Several of the examples above provided mostly positive interactions with professors about writing and the result of meetings was often increased clarity about the approach to writing and the professor's expectations. As was mentioned in Chapter V, several of these instances may have been beneficial endeavors within domains, but without adequate supports for engaging in this work, students sought out explanations from professors. The kind of information they were seeking included aspects of disciplinary language and structure (e.g., literature reviews having thesis statements or not), clarification of the purpose and problem frame when it lacked (e.g., purpose or appropriate

scale/scope/direction of an essay within a domain – what is a problem a person could investigate), and literacy practices in new domains (e.g., how to present a poster without repeating exactly what is written). The questions that students had required disciplinary supports and scaffolds for students to engage in the activities and tasks. Instead, when scaffolds were absent or insufficient, students sought clarity in person from the professor or instructor. The professor was often able to make this visible to students, but the indications of navigation and need for clarification made me wonder, how did other students navigate these tasks without the scaffolds and potentially without attending office hours? What were the ultimate outcomes of these learning endeavors and gains in disciplinary practices and skills?

Most often the professors were helpful during office hours in clarifying issues; however, this was not always the case. In a few instances, students would meet with professors and it did not result in gaining more clarity or insights. Michelle provided one example of these meetings. During a difficult transition in college, Michelle explained the challenge and technical skill she felt she lacked as she was taking drafting and interior design courses in college. She explained that the projects were “all so difficult. Hours and hours of work, with no room for error. And each time you messed up, your grade went down. So I decided I could go to office hours. But, that just turned into me sitting there as they told me all the ways my project was wrong – I was thinking, ‘yeah, you already told me that.’ But, they would give me no feedback as to how I could improve it” (Michelle, interview, 3).

Clarification on studying for exams. Another function of students meeting with professors during office hours was to navigate the constant tests and exams that were a

part of many of their courses. Students would meet with professors to clarify what would be on the exams; this seemed to result from the sheer volume of information that students reported being responsible for knowing and often responsible for memorizing. Not surprisingly, one of the most frequently used words in students' descriptions of college was "slides." It was used hundreds of times across interviews as a reflection of the amount of lecture-based presentation slides students experienced and studied across their courses. For one exam, in a physiology course, Shyloh explained "there were somewhere between 1500 and 2000 lecture slides. And me being me, I went through all of them" (Shyloh, interview, 5). Jane echoed Shyloh's sentiments by saying, I would say on average in some lecture classes we would have 50 to 100 slides per class and another 3 to 6 chapters in a textbook and maybe an article or two depending on the class" (Jane, interview, 5). Students knew that much of what they had to display as memorized knowledge was not necessarily what they would have to know about a discipline or a domain for the future. Regarding this temporary use of knowledge, Jane explained "I know that quizzes and tests are just a part of some sort of professional accountability of professors and not for the sake of my actual knowledge. Because I would say at least 60% of the information on tests is not anything I should ever have to retain....unless I am on Jeopardy or something" (Jane, interview, 5). Part of how students in this study navigated their preparation for exams was seeking additional knowledge and insights into how to focus studying, organizing for exams, and "tips" from professors.

Several students met with professors regarding difficulties on previous exams and the desire to do better on future exams. Jessica reported attending office hours often with organic chemistry to navigate these difficult exams:

Bridget: how did you handle difficult exams?

Jessica: I would go to review sessions. But, then when those weren't helping, I went to the professor and was like, "please help me." She suggested some things about studying the material – she said, "do this, do this. Don't read the textbook. Use the textbook as a reference, but don't read the entire thing. That is a waste of time." (Jessica, interview, 4).

In this case, Jessica's professor supported her to navigate the exams and how to study, but also how to use the materials, like the textbook, as a reference as not a text that was read cover-to-cover. In similar fashion and for similar purposes, Jane explained that she met with a professor in her Earth Science class to discuss "how to do better on the second exam" and the professor's reply was that "lectures are the backbone and don't be afraid to get more help." Jane explained that this advice was "generically unhelpful" (Jane, interview, 5). At times, students reported that professor's feedback was helpful in regards to studying and clarification on exams, and other times, it was wholly unhelpful and confusing.

In her biology course, Erin sought assistance on her exams. She met with her professor for clarification on content, but the purpose was for use on an exam. As Erin reported, the professor described the content but also tied understanding for the purpose of the exam including "needing to know something" and "not needing to know." Erin described attending biology office hours:

We sat down there and she drew out all these pictures... "Here's where you're confused. Here's where your issue's at." One thing I really liked about her, she was like, "Why don't you explain it to me and then I'll fix. I'll see where your confusion is." She's like, "Here's what's happening." She drew out this big diagram. She's like, "This is what you need to know." She told me "you don't need to know that for the exam. Can you say something about mitosis, then you are fine. You don't need to know all that detail." That helped me out. (Erin, interview, 3).

This was helpful to Erin because it provided individual teaching and assistance around a topic. This likely improved her understanding for a next exam. Because Erin's professor

provided information only in the context of what Erin needed to know for the exam, Erin likely constrained her knowledge to what her biology professor explained would be relevant for the exam instead of an expansive understanding of the topic.

Ryan provided another example of meeting with professors to understand what was on exams, especially those exams that had a lot of material and he wanted to know “where to put [his] energy”:

I went to office hours for every class this term. I went a lot. Art History I went the least. That class was straightforward and just memorization. For stats, econ, I would always go a few times before exams. During those meetings, I asked the professors ‘what do I need to study?’ and see if they would tell me or not. Or if there was a really confusing homework problem...I would show up another time... I would ask about certain questions – and based on their response I could figure out if I needed to study it or not for the exams. That helped me tailor where to put my energy and time for studying. (Ryan, interview, 5).

In his cultural anthropology course, a lecture-based course, Ryan also reported going to office hours for insights on what to study for an exam; in this case, he would go to office hours and the “professor would tell me exactly what to study. I think he was rewarding me for going to office hours” (Ryan, interview, 3). At times, Ryan interpreted that the courses were “straight forward and just memorization” and other times, the exams and studying took more navigation and skill. Ryan explained attending office hours a “few times before exams” in statistics and economics to ask about what and how to students for the exams. He also asked about confusing homework problems, but “I would show up another time,” meaning Ryan separated the purpose of each meeting. The information he obtained helped him study for exams more efficiently and effectively.

In a final example of students navigating courses and exams, Wyatt described a situation when he talked to a professor during an exam and requested clarification. During

his classical civilization exam, Wyatt reported asking the professor if he could “approach the essay like this?” and the professor said, “sure you can do that. Which was reassuring because I hadn’t been positive before about what to write or say on this essay question on the exam. But he told me it was a right way to go” (Wyatt, interview, 4). Wyatt requested the professor’s insight during an exam regarding an approach to a question – although it was not a part of office hours, it was another example of how students negotiated the demands and knowledge necessitated on exams.

Discussing and Interpreting Content

Andrew explained that the difference between high school and college was that “it was a more independent on what you were expected to do. In high school you could ask a teacher about your experiment not working. Instead now, you would go to office hours and seek it out, which was a little bit different” (Andrew, interview, 4). Many of the students reported attending office hours as a way to clarify, discuss, and interpret content from the course. In this case, students did not attend office hours to discuss concepts in the service of exams or study. Rather, in these instances, students reported going to office hours to discuss content, problems from class, a concept that remained vague or unclear. As Wyatt states about attending office hours more to better understand his major, Wyatt put it plainly, “I need to go more because I need to know more” (Wyatt, interview, 5).

In his physics course during his second semester, a course focused on electricity and magnetism, Andrew reported attending office hours “quite a bit...because it’s just very new, very different material. A lot of the rules that used to apply no longer do. It felt very abstract at times, so I went to [office hours] to figure out how to make sense of it...I kept my questions conceptual, and occasionally I’d come in and say, ‘this problem makes no sense to

me'...'where do I need to start'?" (Andrew, interview, 4). Andrew navigated new material by discussing concepts during office hours; at times, problems from a problem-set or homework became the artifact that the professor and he discussed. However, other times, he went to discuss material conceptually.

Jessica told me that she "met with my writing sem[inar] professor all the time" (Jessica, interview, 6). This course was focused on building a final writing portfolio and used the theme and topic of genetics as the focus of the writing and reading in the course. Jessica explained that she and her writing seminar professor "got along great and we had lovely discussions. In one instance, I had a piece missing in my paper. I asked her if she had any articles or book that could fill that gap. She's send me eight, eight citations to try when I got home. I talked to her all the time because, as much as I was gaining expertise in my field, it was expertise in this tiny little wedge of the field" (Jessica, interview, 6). Jessica was interested in studying epigenetics and made this her particular focus inside of the genetics writing course; her writing seminar professor knew the landscape of the field and Jessica explains that she could ask, "are there any other people that are really, really important to the field of epigenetics and research in addition to [epigenetics researcher]?" Jessica said her professor gave her multiple resources and people to read work by and her suggestions "were perfect. It was exactly what I needed" (Jessica, interview, 6). These conversations, Jessica described happened at office hours and occasionally over email. The specific teaching and support of Jessica's particular topic happened outside of course time and as a result of Jessica taking initiative to meet with her professor. It proved to be helpful and provided Jessica with new knowledge of the field and the actors within her specialization topic.

In a final example, Jennifer reported a time she attended office hours to discuss content for astronomy and for her linguistics course. Jennifer said that in astronomy she encountered a few questions and problems that she was not certain how to begin. Jennifer explained, “I went to office hours a few times and asked, ‘I don’t know how to start this problem. Can you help me?’ Sometimes it would help and honestly sometimes it didn’t...he was pretty helpful most of the time” (Jennifer, interview, 3). In a separate example, Jennifer attended office hours with her teaching assistant about linguistics. Jennifer reported, “I went to ask about allophones and there was something that I didn’t understand at all, and the TA was like, ‘this is too hard for you guys to answer’ and he changed the question on the homework. I am not sure if that was OK but, that is what he did for me” (Jennifer, interview, 4). In these two somewhat contrasting examples, Jennifer described attending office hours with a professor regarding content and understanding of material in astronomy. She indicated that the professor was helpful in supporting her understanding of the material; it also seemed like Jennifer went to office hours regularly when she explained, “he was helpful most of the time” having had multiple times she visited the professor. In her linguistics office hours, Jennifer described her TA changing a question because it was “too hard for you guys to answer.” This was an interesting use of office hours, as it did not seem that Jennifer received an explanation about her confusion, just that the question was changed to make it, in theory, “easier.”

Monitoring Learning and Course Grades

Students met with professors about two dominant topics in attempts to monitor their own learning and their course grades. First, students often reported that they did not receive a “feedback loop” on their homework, practice questions, or material from class on

a regular basis. They reported not having a way to monitor their understanding, especially in advance of heavily-weighted exams that were prevalent across courses. Students reported meeting with professors to gain insights and understanding of material. The second reason students met with professors was to inquire about grades; students reported having uncertainty about where they stood in courses, especially those courses where “curving” of grades was common. As a result, students sought out answers about their grades and their standing in the course by meeting with professors. At other times, students reported that grading happened so infrequently, or with such a substantial amount occurring the end of the semester, that it became almost impossible to monitor their own course grade or, at times, their understanding of material. It should be noted that students recognized the somewhat artificial nature of exams and grades – they knew the grades did not necessarily mean they did or did not understand something, but grades, as the external representation of their “knowledge gained,” were important to students.

Ryan tended to meet with professors frequently about grades and discussing grading on tasks and tests.

Bridget: have you ever followed up with a professor about a test or task in a course?

Ryan: I would do that a lot actually. I tried in econ. Not successful. We had multiple choice tests and in one instance, I chose wrong, but explained my logic which made a lot of sense based on the topic. He accepted it...but he didn't change my grade. I also followed up in Latin about approaches to translation and choices I made, and also in Bioanthropology. I followed up a lot about points and responses. I would sometimes get point back on things if I went and talked about it. (Ryan, interview, 4)

In a slightly different instance, Ryan met with his psychology professor because of a lack of understanding of how he was performing in the class. He said:

I met with my psych professor one time just to see where my grade was. She actually didn't give us the whole test back, so you didn't know what you got wrong. You'd just get the slip back with your multiple choice bubbles filled in. It would show you how many you got wrong, but you didn't know the question....so I went in for feedback...for the final. I was kind of in the dark about what I did and didn't know for a big exam (Ryan, interview, 3).

In Ryan's two examples, he illustrated ways and reasons for how students discussed grading and monitored their learning. In the first examples in bioanthropology, Latin, and econ, Ryan discussed grades with professors and asked about getting back points on exams and quizzes when Ryan felt like he understood the material, but that this was not necessarily reflected on the final grade or in the feedback on the exams. In psychology, Ryan discussed materials and results on exams because comprehensive feedback that helped him prepare for future assessments and monitor his understanding was not provided. He debated grades during instances that he believed he knew the materials and justified his answers and choices in ways that were not allowed for or provided on the exams. As one example, he explained his reasoning of a multiple choice question that would not allow for his explanation or description of his knowledge on the topic. This negotiation about grades indicates the use of social and cultural capital and techniques for navigating academic spaces and academic "currency" of grades.

Similarly to Ryan's meeting in psychology, Erin reported that in her statistics and experimental design course she had to go to office hours to get feedback on her exams. Erin explained, in statistics, "he wouldn't give back exams...you could go during office hours and look at the exam, but like, he would never hand it out to you in class...the day after the exam he would go over all of the questions....and you would be thinking, 'what did I answer for that? What did I do?'" (Erin, interview, 6). Erin used office hours, not necessarily as a space to bring up issues about grades, but as a way to learn about what she was able to

answer and what she struggled with on previous exams. The students in this study were accustomed to using previous exams as indicators of their learning and as a way for anticipating what would occur on future exams. Without these artifacts from courses, students would often meet with professors to request that information.

In other instances, students reported following up about grading with professors and teaching assistants if they were uncertain about what the grades meant or how they could improve in the future. In one example, Andrew explained:

I checked with my math TA because I got a problem back that he'd counted off, but all he'd put was a question mark. I didn't understand what I'd done wrong. It seemed to me that my explanation was the same as his, just worded a little differently. Turns out, I'd misunderstood a term and what it ... Not what it meant, but what the subtlety was, in it. Kind of like if you used..."less than" for a "less than or equal to." That kind of thing. I just missed it in his explanation compared to mine. When I asked about what the question mark meant, [the TA] explained that he had been kind of rushed and just rushed through the grading. When he saw the answer wasn't the same as what he'd gotten, he just put a question mark and marked it wrong. Then I went back and he walked through it with me, so I got that explanation. (Andrew, interview, 4).

Andrew used office hours to gain feedback on grading in ways that helped him understand the material and approaches, even the "subtlety" of language in this math course. Without attending office hours, he may not have known what the difference in language meant or how to approach a problem in the future. Further, Andrew was able to obtain more detailed explanation on his approach, instead of just a "question mark" and a grade.

In asking Andrew about how he received feedback on problem sets, homework, and lab reports, Andrew told me that much of the time the feedback was very limited and that students had to instead, follow up with professors individually. To him, this was a common practice. Andrew said, "you get the problem sets returned with marks on what you did

wrong. Typically, there is not written feedback. You can go to office hours and ask ‘what the right way to do this? Or how’s I get this off?’” (Andrew, interview, 5). Andrew reported going to office hours across many of his courses to discuss grades, but mostly in the service of understanding and monitoring his own understanding. At times, when he met with professors it revealed that there were other approaches to the same problem and that his was also an appropriate approach. Andrew said in his applied mathematics course, he told me that he realized, while explaining with a slight smile and a bit of laughter, “occasionally the [TAs] were not very thorough in seeing if you had actually done a problem correctly, but not the way they expected. I did go to them a few times and just say, ‘Hey, the answer matches your and is this not a valid way to do it?’ They would look at it and say, ‘Oh...that’s ok” (Andrew, interview, 6). Andrew brought up grades, but described doing so in a way that was more inquisitive than accusatory (of a grading mistake), even though he found more than a few examples of errors on his assignments. This meant frequent discussions with professors and teaching assistants regarding his learning, their feedback (or lack of feedback), and interpreting and monitoring his grades and performance.

In a similar example to Andrew, Jennifer gave an example of having to follow up on grades because she was very surprised by the grade given that she felt prepared and that she had done well on the exam. In her biology course, she got a “C” on the first exam. She said, “I was very surprised by a C, but I didn’t know how it was graded or how things added up. So, I went to office hours and [the TA] looked through the exam and said, ‘it seems like you did really well on this exam. I don’t know how you got a C.’ Then she added it up and she was like, ‘I added it wrong’” (Jennifer, interview, 3). Jennifer explained that going to see the TA and check the exam with her meant that she had an A instead of a C on this exam.

Jennifer had felt prepared for the exam and even felt that she had done well, so the grade and the feedback did not reflect her sense of performance. Jennifer was able to mitigate human error and a much different and lower grade by advocating and navigating office hours, specifically about exams.

Cassie indicated that she met with her professors often, with some professors almost up to a standing appointment each week – “I met with my anthropology professor almost every Wednesday because that was his office hours day” (Cassie, interview, 4). Part of her reasoning for meeting with professors with this frequency was monitoring her performance in her courses. She explained:

it’s kind of frustrating for me. I loved in high school how we got progress reports...and you could see online how you were doing. I would love to have that now. I have to wait to see how I am doing. I had to meet and ask them because I just couldn’t wait until the semester was over and I still wouldn’t know. (Cassie, interview, 4)

It is a surprising and stark paradox that universities and college had such emphasis on exams and testing, while simultaneously having significant lags in providing meaningful feedback to students. This paradox meant that students were left on their own to independently navigate courses, professors, TAs, and communication among the various players to understand their assignments, what to study on exams, how they were progressing in their learning using formative markers and information, and how to monitor their own grades and performance across courses. Students experienced information in office hours that seemed as if it would have been a beneficial structure of inclusion within the course as a whole. Professors revealed approaches to reading, writing, presenting, and studying in specific ways (sometimes disciplinary ways). At times these recommendations were disciplinary and specific (e.g., how to write a lit review, how to present a poster, how

to narrow a focus for a paper assignment). At other times, professors provided insights into how to approach the course and how to be successful within the requirements of the course (e.g., how to study a textbook, what concepts to study for an exam). Students navigated their confusions and questions by enacting their agency and requesting clarity from professors. Because these students possessed privilege, had high expectations about their learning and their own understanding, and also were used to communicating with teachers and others about their academic work from high school, these eleven students met with professors as a part of their regularly and largely felt comfortable doing so. I doubt, however, that all other students feel this empowered, or even know that this navigation work would be expected of students in college.

In the next section, I present a case of three students who navigated and acted as agents of their learning, at times successfully and other times unsuccessfully through major transitions in college. I offer this case as an elaboration of the construct of navigation, which involves the course level navigation observed from earlier in this chapter, as well as the institutional navigation in college.

Navigating institutions: The case of three students and “alternative paths” in college

This case involved three students, each of whom left a four-year university or college, and either took time off, dropped out, left for academic reasons, or left to pursue a career. Cassie was a student at a small liberal arts college in the Midwest, the same college as Ryan attended, at the start of this study. Michelle attended a medium-sized four-year university in the Midwest, the same school as Hope. And, Jennifer attended the same school as Shyloh and Jane, a large research-university in the Midwest. These three students experienced many of the same patterns among their college learning in their institutions as

was observed across all the institutions analyzed in this study. Students mentioned having lecture-based courses, textbook reading, and a lot of exams as the primary activities of college.

Patterns among alternative path students indicated how students are sometimes forced to navigate institutions to determine fit, goals, value, and manage their academic experiences. Students experienced instances of exclusion from domains, difficulties managing the navigation within large institutions, and instances of lack of institutional supports. I present each of the three cases that outlined the individual students' experiences – Cassie, Jennifer, and Michelle – and then draw connections among the cases.

Cassie: Navigating Exclusion from College Domains

Cassie entered her small liberal arts college in the Midwest thinking she wanted to pursue theater or drama as a major. She enrolled in a few courses, auditioned for plays, but was not included in what she called the “elite and exclusive group” of theater and drama at her college (Cassie, interview, 3). She explained that the school pushed a “very specific algorithm about acting, and said that this one way of acting and this one style of acting and writing is the only way. So, it kind of tuned me against theater” (Cassie, interview, 3). Cassie became increasingly frustrated with this format and also reported feeling very much like an “outsider.” She was upset about this experience because “in high school I really loved it, and I want to still continue to do it if I can, but I think I am going to focus on new things now. It was stressful, when I was dealing with this...a lot of the passions that I came into college just, disappeared. They all changed, every single one of them” (Cassie, interview, 3). Cassie reported meeting with her advisor a few times about her courses and feeling of exclusion in

the domain. At his suggestion, she joined a sketch comedy group and liked that, but felt that she had to replace much of her course pursuits and change majors.

During the same semester, Cassie started expressing an interest in film and philosophy and said she might pursue these courses in the next semester. She lamented that the film program was very small in her school – only two professors. However, she experienced very interesting learning opportunities in her film courses. During her second semester, Cassie enrolled in two film courses and she described a new sense of belonging in this domain. She said, “our film courses are definitely more discussion... I love it, this class is my favorite. Probably 80% of the class is us talking. Discussing and bringing up different themes and ways to analyze the films...it was a lot more conceptual and aesthetic” (Cassie, interview, 4). In this same semester, Cassie took philosophy which stood in stark contrast to film, although she thought about majoring in both; “introduction to philosophy, my professor really didn’t care about anyone. Like he DID NOT care. At all. He told us. ‘I don’t care about you.’ And we were like, ‘OK’” (Cassie, interview, 4). Again, her philosophy course structure was a stark contrast to her film course. Cassie said, “participation wasn’t a part of the grade at all. It was 100% lecture. He never asked a question really. Let’s just say I decided to miss that class a few times for ‘personal reasons’” (Cassie, interview, 4).

Within her first year of college, Cassie was faced with many instances that required her navigation, which was often guided by her sense of belonging and also her agency within these spaces. Cassie sought out and was validated in different spaces through inclusion and being positioned as an “insider.” In spaces where she could participate, join a group, or discuss ideas, Cassie felt a sense of belonging. In spaces that kept her on the outside, Cassie opted out of the environments – leaving acting and theater to move to a

different major, not sustaining her interest or participation in philosophy because of a dominance of lecture in the course (and a professor with what seemed like a lack of care of students). Inside of these spaces where she felt belonging, she navigated the demands of the courses with much ease and enthusiasm. As one example, she wrote an extended paper in film on the prompt “to choose something specific in Italian film. It could be a specific theme, film, or filmmaker. Ask a question about it and answer it through research” (Cassie, interview, 4). She was excited for the choice and freedom to explore. On her transcript from this interview, there were at least four pages of text dedicated to her description of this paper and her interest in it. Cassie reported receiving some critical feedback on the paper which revolved around the exploration of too many themes across many films by Fellini (an indication I noted as enthusiasm about a topic), but she remained positive about the insights and the feedback was embraced as beneficial and not deterring. Ultimately by the end of the term, she changed her major to film.

At the end of her freshman year, Cassie mentioned the idea of transferring schools. Cassie explained that she did not enjoy some of her course work and with her new interest in film, she thought about transferring for “academic reasons as well because [this college’s] film program is very small...I can’t really go out and do stuff, here it is just sitting in class and learning, not making films, or seeing films that come to a large city. We don’t have the specialized equipment. So I am thinking about transferring schools” (Cassie, interview, 4).

Although she had positive experiences in her film courses, the culture of the surrounding school and her other courses were less inspiring. During her sophomore year, Cassie completed a few weeks of her courses, but for several reasons some personal and

some academic, Cassie had dropped out of her college and was taking time off from college entirely. She described her decision-making process, “I was becoming very discouraged when I tried to do some of the same activities that I used to enjoy and I saw the differences. And I didn’t feel like I belonged there. It was hard coming home because I felt like, I should be with the other kids, succeeding in college. But, this wasn’t the right fit and I didn’t have the right experiences” (Cassie, interview, 5). Unfortunately, it seemed that the place where Cassie found belonging was not a great fit as a robust academic program at her college. She was forced to navigate her university environment and ultimately determined that she needed to leave her school. She took time off and began applying to schools with larger film programs. After about 8 months out of school, Cassie was accepted and enrolled in a large research university majoring in film.

Jennifer: Navigating the Culture of College and Professional Goals

As background to this case, it is important to provide a bit of context of Jennifer’s college experience. Jennifer attended a large research-university in the Midwest. She progressed in her coursework, taking courses from across domains to learn about things in which she might be interested in majoring. Table 6.1 provides details about Jennifer’s college courses and the structure of grades in the courses. Her Latin and English courses were small, but the other courses on average were about 200 students. She did have recitations with smaller discussion sections, but as explored in chapter 5, the recitations were largely used for another lecture space and Jennifer reported not “really enjoying the discussions. They were fine, but I don’t know what we were doing there” (Jennifer, interview, 4). In the courses that Jennifer had writing assignments, the grades on papers were a significant portion of their final grade. Jennifer had papers as a part of her work in

English composition (90% of her grade), African American studies course (60% of grade), and Linguistics and Religion (80% of grade). The other classes included smaller projects, mostly non-collaborative. Jennifer still had a heavy proportion of her grades based on exams.

Table 6.1: Jennifer’s college courses freshman year

	Exam-based (finals, exams, quizzes) grading	Homework	Other (papers, projects, participation)
Advanced Latin 200	75%	0%	25%
Astronomy	36%	50%	14%
Linguistics 101	40%	40%	20%
Biology and animal behavior	90%	10%	0%
Introductory English Composition	0%	10%	90%
African American Studies: Southern Novels in Historical Context	30%	0%	70%
Latin 300	80%	0%	20%
Linguistics and Religion	0%	0%	100%
Biophysics and imaging	50%	5%	45%

I provide this background and course outline as the introduction of this case because I think it matters that within the culture of college and these courses, Jennifer largely felt like she did not belong in college and that this was not her desired path. Part of why she felt she did not belong was the “party” culture of college, where students lacked discipline or interest in academics. The subjects and courses that Jennifer took also made her feel distant from her learning and to her highlighted the lack of “real-world” skills within her courses and in the assignments of college.

Toward the end of our first interview, following her first semester in college, Jennifer told me that she was leaving college. It seemed she hesitated to tell me about it to

start – we had been interviewing for almost 30 minutes by the time she told me she was leaving:

Jennifer: I don't enjoy college very much. I wish we would have had other options known to us, maybe even since high school. Like what if college is not for you..."

Bridget: What would you rather be doing?

Jennifer: I am joining the Marines. (Jennifer, interview, 3)

To that point of the interview, Jennifer had not shared very much about her courses. What she did share, indicated that she found the work irrelevant to her life and "nothing was super interesting" (Jennifer, interview, 3). Jennifer told me about articles she would read in her courses and tests she took on linguistic structures and phonetic spelling. She told me about memorizing for astronomy and biology. She told me "I am learning all of these things I don't really want to learn" (Jennifer, interview, 3).

Jennifer was adopted by her parents from another country as an infant. Jennifer explained that she was joining the Marines because "it is something very physical...I have always, for my whole life, sat and thought. I think it would be a good change to do something different. I came here, this country gave me everything I have. Might as well pay it back. This seems interesting and challenging. College didn't challenge me. It wasn't that interesting. I am choosing the interesting one" (Jennifer, interview, 3). Jennifer continued to describe why college was not the right fit for her now. Jennifer said that she "was definitely prepared for college...a lot of people just don't do work. They go out and party...they aren't really there for the education, some of them, I think. They could do it if they tried, probably. I guess academics isn't really why they are here" (Jennifer, interview, 3).

Jennifer decided to finish out her first year of college because with one year of college she could have a promotion in the military. During this semester, she emphasized how much lecturing she attended; “lectures were just so boring, and discussions were useless” (Jennifer, interview, 4). Jennifer explained that the work she was doing was not interesting and it was so specialized, she was not sure what to take from these experiences. She explained everything was “impractical and pointless” (Jennifer, interview, 4). Even with issues of motivation and interest, Jennifer still earned an incredibly high GPA in her first year of college, a 3.9.

Her largest struggle of this second semester was staying motivated and engaged enough to finish the term. Looming in her mind was boot camp for the Marines set for May. Jennifer finished the term and went to boot camp. I continued to follow-up with Jennifer while she was stationed with the Marines. Jennifer was training to be a mechanic with the Marines which involved courses, training, and hands-on learning. She explained that she had “no background in this at all, and some other people had been doing this work for 10 or more years” (Jennifer, interview, 5). She found a tight-knit community of people who instilled the importance of discipline, authority, and respect, but also a community of people who would help you “if you ever needed anything...” (Jennifer, interview, 5).

After a year of training with the Marines and becoming certified in her job as a mechanic, Jennifer was able to have more freedom with her time and decided to start taking courses online that the military would assist in paying for through a local community college where she was stationed. She again reported that the courses were “fine, but not super interesting.” In a recent follow up, during what would now be her junior year of college, Jennifer proudly reported to me that she was accepted to attend the

United States Naval Academy in what she hopes will “help provide some of the academics...and also the discipline and service I was hoping from the military” – she will begin this journey in Fall 2018.

Jennifer was ready for college academically. She was not ready, however, for the social and cultural climate of college. The lack of discipline and lack of interest in academics among some of her peers communicated to Jennifer that this was not a community in which she belonged. As a compounding factor, the courses that Jennifer was taking during her freshman year of college did not seem relevant to her life. Of course, it may not have mattered what she was taking in college because the culture and environment would never have been the right fit. Jennifer did show deft navigation of her college environment, however, still earning very high grades despite not being interested in material and being less than motivated for the work. Not only did Jennifer have to navigate her college environment, she also navigated the culture, opportunities, and requirements of the Marines: seeking opportunities to continue school; learning about a new job as a mechanic; and, understanding how to interact with others in the military regarding rank and position. Ultimately, she pursued and sought out the opportunity to join the Naval Academy for a different experience of service linked to academic and military training. Jennifer’s case indicates that readiness does not just refer to academic readiness, but also the ability to recognize fit and desired outcomes of college learning. She also illustrates the diverse navigation skills needed to pursue various paths after secondary education.

Michelle: Navigating Institutions and Academic Difficulty

Michelle attended a medium sized, 4-year university in the Midwest. I had a difficult time being in touch with Michelle during her freshman year of college. When I asked about following up with her and discussing how school was going, I rarely received a response. Then, in the spring of her freshman year, we met together and she explained her experience during the previous year.

Michelle explained that she went into college considering interior design as her major. Her college advisor showed her course sequence document that indicated starting her major area requirements would be necessary her first term because so many courses were required for this major. Michelle explained:

I met with my academic advisor and she recommended the courses...This is what they recommended. They laid this out, and the thing about interior design at [college name] is... they have it laid out so that you're taking five or six classes every semester for four years. They're all major required classes. So, they don't even have any gen eds in there. You have to take gen eds during the summer, or you have to be there for more years. (Michelle, interview, 3)

Michelle's description had a bit of hyperbole, but in researching the course sequence in her college, it was true that students would have between four and five major area courses to take each semester in interior design. The courses are also recommended to be frontloaded, meaning students would take four or five required courses during their freshman year and taper off interior design courses so that the last semester, students have three courses and a lab (only one credit hour). Michelle enrolled in the courses as the sequence sheet recommended during her first semester and also at the suggestion from her advisor. Michelle's courses from her freshman year are outlined on table 6.2.

Table 6.2: Michelle’s Freshman Year Courses

Semester 1	Semester 2
Interior Design and Studio	Introduction to Cultural Anthropology
Interior Design and Psychology	Composition
Interior Design Theory	Literature course
Drawing and Design	Calculus I
Speech and Composition	Introduction to Cultural Anthropology

Michelle described how she tried her best to keep up with the new material that she was learning in her courses, which required entirely new skills like drafting, drawing, and design work: technical skills that she had not developed previously. She explained, “the work just became so much. My studio classes....the first I had to drop was drawing, I was just failing it. And then I was forced to drop speech. Then my other two courses, I barely got a passing grade. Without a doubt time management was hard. I was working like 20-30 hours a week. I was going to class at 9:00am and coming home like after 10 o’clock at night. Because I was just in the studio all day long trying to do these projects” (Michelle, interview, 3). Although this case explores Michelle’s experiences in navigating her college environment, it is worth noting that her experience in design courses and drawing were largely routinized and scrutinized for even minor errors in formatting. This meant projects had points deducted for small errors, noticeable on the assignment sheets that listed multiple pages of bullet points of formatting and detail requirements. It was a precision-based course with students who had not learned the precision or the purpose in drawing and design. The courses were incredibly difficult to get through – Michelle reported over half of the students in a semester dropped the classes around the same time as her.

As Michelle detailed, she did not maintain a high GPA after her first semester of college, largely attributed to difficulties in managing her work and her skills in this new

domain of design work. For the next semester, she attempted to enroll in general education coursework and raise her grades. During her second semester, Michelle was able to continue in three of her four courses, but dropped one. Because of her lower grades in her first semester, she was placed on academic probation and was going to have to face a “committee about her standing at the university” (Michelle, interview, 3). She told me she had to talk to “like 8 different people over the course of the semester to figure out what this all meant. The last person was the one who told me, ‘you’re going to have to go through this, face the committee, then you will have to appeal, and they will be the final ones to decide’” (Michelle, interview, 3). Michelle explained that the information she received was “the committee might let me stay enrolled on a semester-by-semester basis. And every semester I would have to meet with the board and say where I was with everything” (Michelle, interview, 3).

Michelle lamented that “there is not communication between colleges, between levels, between advisors, professor, and students. There is no communication whatsoever, which is why I was getting a different story every single time when I was trying to figure out how to do all of this” (Michelle, interview, 3). Michelle determined given the circumstance, this university was not the place for her to continue school. She reported that after that experience she “didn’t want to look at another textbook. I didn’t want to think about college. I wanted to take time off because I felt like I had really failed. It took a lot of encouragement from my boss and my father and grandmother to even attend the orientation at [local community college] and even apply. I didn’t even want to” (Michelle, interview, 3). Michelle even apologized for not being able to meet during the time at her previous school; she said, reflecting back on the time when she was not able to discuss:

“Bridget, love you, you are the best, but I don’t want to talk to you. I would have been in tears the entire time. But now I am ready to tell you that this happened, because I have a new plan. And I know it is going to be better” (Michelle, interview, 3).

Michelle enrolled in a local community college and continued to work in the coffee shop in town for 30 hours a week. It helped pay for her rent on her apartment and she “really, really loves” her job (Michelle, interview, 4). Michelle reported feeling more success and validation after entering a new program at her community college (Michelle, interview, 5). She contemplated a small business management major or maybe biology. Although she did not have specific plans for a major, she felt like the advising at her new school emphasized getting general education requirements completed and explore some classes to see what interests her; she could not believe when her advisor at her new college sat down and Michelle said, “I had all of these academic questions, and what classes, and everything...she pushed the papers aside and said, ‘for 10 minutes, we are going to sit down and talk about you. What are your hobbies? Where do you work? What’s your life like?’ No one at [old college] asked me that” (Michelle, interview, 4).

Michelle successfully enrolled in three courses each term including mythology, anthropology, and psychology her first term, and sociology, biology and a biology lab her second term. She maintained strong grades and spoke very positively about her experience. She often attended office hours and formed relationships with her professors. Part of how she explained her current circumstance, however, was repeating that “the big four-year university was not a set up or an environment” that worked for her; “the way I live my life and how I learn, and the way I take in information. It did not work” (Michelle, interview, 4).

Michelle had to navigate her university environment as a student early on. She was required to meet with various advisors, academic officers, boards, and was provided with a great deal of information that indicated to her that this “failure” and academic struggle made her feel “like an outsider at the university. I didn’t feel like I was a part of that school anymore. No one was helping, just telling me I was at risk of having to leave” (Michelle, interview, 5). She felt ostracized and often confused with this process. With support from her family and friends, she sought a different educational opportunity and had a better match and also what seemed like much better support from advisors and the college itself. Her demeanor from the first interview to the fourth was noticeably improved and she felt much more positive about the outlook on graduating. Michelle illustrated how navigation happens within a course, but also in the planning of your coursework and how essential advising and communication with professors is. Michelle met with her professors at the original university but remained uncertain about how to improve or really what her options were. Michelle told me, “I got to the point where all I could do was drop. That was a huge waste of money. It was drop or fail. I wish there was something else I could have done. Like, know I was going to struggle or this isn’t the right class for me and change it up. Take something else. It was too late” (Michelle, interview, 3). In her new community college, Michelle felt supported and successful. She looked forward to attending class and enjoyed the work. Even Michelle, who possessed agency and the ability to talk with adults and navigate institutions, was tremendously confused about the process when she was struggling academically. Her case demonstrated how much responsibility is placed on students in college and how institutional navigation can affect students’ outcomes in college.

Conclusions about “Alternative College Paths” Case Study

These cases demonstrated the ways in which students had to navigate at the institutional level of college and universities. This meant that students used their agency to reflect on and assess the fit of the university, how to construct meaningful experiences for their own learning and goals and take responsibility as individuals for the paths of their desired outcomes. College was not a one-size fits all environment. All three of the students echoed repeatedly that they wished there was more understanding and discussion about other alternatives to college when they were in high school, and maybe less stigma associated with changing paths. Cassie said, “the big thing that impacted my college experience was the negativity about....transferring, gap years, and just plans. I felt like there was a ton of pressure to sticks with one college, like a big name college...get your perfect medical degree, or science degree or whatever” (Cassie, interview, 5). Michelle and Jennifer also explained that they had wished other options were discussed and other paths were aspects of their decision-making. Jennifer said, “everyone went to college. And with our high school teachers, they all say, ‘college is so great!’ And then I got to college and thought, this is it?” (Jennifer, interview, 4). The students were able to navigate and then construct their next experiences and more appropriate paths for themselves, but not before experiencing much difficulty. Students attempted to navigate advisors, course options, academic work, expenses, all while assessing the fit and environment of their learning.

Even these students who showed all markers of academic readiness experienced immense difficulty in college. This difficulty took the shape of social-emotional readiness or lack of social-emotional support in college, it involved a lack of academic support and sufficient advising, and confusion in navigation of institutions of college to determine

school fit and future goals. College readiness, in this regard, indicates again another layer of responsibility; the enormous expense of college, the stigma around changing courses once enrolled in college, and the limited definitions that students experienced around the “best” paths in college put enormous pressure on students. Cassie described this by saying “college is a huge transition, and you have so much invested now – time, a lot of money, and everyone expects you to do well because you were prepared well – and the world is really big, and I have a lot of responsibility, but I haven’t even lived like a one-fifth of my life yet. I am only 18. It is a lot when I am still a teenager” (Cassie, interview, 4).

These cases provided stories of how students agentially navigated difficulties and experiences of college. In the next section, I continue to present other ways that students *constructed* their own disciplinary experiences to learn about the domains they wished to enter in the future.

Constructing experience in their domains: Extra- and co-curricular experiences

When these eleven students determined that they needed more skills and experiences within the fields and domains they wished to enter professionally, they established and sought out extra and co-curricular experiences. These experiences took various forms depending on the interests of the students and the domain in which they were interested in specializing.

For example, the four natural science majors each worked in an active research laboratory setting over the summer or during the school year. Andrew worked in a lab associated with NASA working on vehicle production and technology used in solar system exploration. Andrew reported working closely with a Principal Investigator in this lab on

design and reading machine outputs. Even during this experience, Andrew was constantly imagining other experiences he was considering constructing for himself – additional courses, internships, experiences with other space organizations. As he explained, “It is a long shot, but I am still excited about the astronaut corps. I am doing to do everything I can to try to do that” (Andrew, interview, 6).

Wyatt, a cellular and molecular biology major, also worked in a lab and had, in fact, worked in the same lab for 2 years. He had worked there long enough that he was co-authored on a paper with the rest of the lab group and also presented material to another organization on the findings of the experiments. He explained, “essentially we are doing trials to expose rats to e-cigarettes and regular cigarettes. We are finding that there are abdominally related issues and also aneurism disease that results. Honestly, our findings are ‘don’t smoke cigarettes and don’t smoke e-cigarettes” (Wyatt, interview, 5). Wyatt had other undergraduate students working for him in the lab and he would train them on conducting aspects of these experiments. The outcomes of this was knowledge about approaching experimentation, but also about interpreting results, presenting these findings to the research community, and publishing these in academic journals. As Wyatt explained, “I learned a lot more about how to do experiments and design [working] in my lab than in my courses. Way more” (Wyatt, interview, 6).

Another natural science major focusing on Chemical Engineering and a member of ROTC, Jessica studied abroad in China during her sophomore year summer because she was also earning a language certificate in Chinese. She took opportunities to learn about specializations in the Navy like submarine operations. Jessica worked in a lab prior to enlistment college and, when time allowed for her to volunteer in a lab, she took advantage

of these opportunities in college. She was focusing on a new specialization in China to learn about language of business Chinese (Jessica, interview, 6). Because of her position in the ROTC, Jessica was more limited in her flexibility to take on additional opportunities during the year and even the summers; living in China for two months was the longest opportunity she had to construct an extra-curricular experience for herself. The program was an intensive application process and was run through another elite college's program; this opportunity took enormous foresight and planning in order to enroll in the exclusive and small program.

Erin, studying neuropsychology, worked in a psychology lab at her college as a research assistant for a study. She applied for the position that focused on research regarding auditory perception. However, Erin felt like she may have been underqualified because she had only worked in research labs focusing on Parkinson's disease and deep brain elation (in high school and summer before college), and in a driving simulator research lab studying how people drive autonomous vehicles (Erin, interview, 4). By the time she was a junior in college, Erin had multiple experiences across different active scientific laboratories both on her campus and another college campus in the summer, each focused on research and study design.

Shyloh, studying social justice and social change, applied for several opportunities for internships, volunteer opportunities, and jobs affiliated with organizations that worked on "reproductive rights or queer and trans rights" (Shyloh, interview, 4). Shyloh's reasoning for seeking an internship was "to get a better sense of how some of those organizations work, and just deciding...if I'd want to be involved in that" (Shyloh, interview, 4). Shyloh also worked at the university as a part of a peer-to-peer training on diversity

issues. Out of that work, Shyloh decided to apply to become a residential advisor and served as an RA during junior year in college. Shyloh plans to continue to be an RA through senior year of college as well. Shyloh constructed opportunities to collaborate with colleagues around different social problems and inequities to seek opportunities to provide support and work toward improvement. They also gained enormous experience with supporting other people with aspects of their lives that involve complex and challenging aspects. They engaged in this work because their goal is to work with trans or queer youth in support or community organization and many of these skills they anticipated needing for future work.

Ryan, an economics student, applied for positions with sports teams, management organizations, university athletic departments, and other organizations to get experience “in the sports marketing agency world” (Ryan, interview, 5). As he explained, “there’s no easy path. It going to be about who you can get in touch with and get experience so that you can get these jobs in the future” (Ryan, interview, 5). When I met with Ryan at the end of his sophomore year of college, he was working for a university doing marketing and writing for the athletic department to use online; he wrote “bios” for student-athletes and their associated statistics on their sports teams (Ryan, interview, 6).

Hope pursued several extra-curricular opportunities for learning about marketing and public relations, which were her chosen professional domains. She applied for and was accepted to work in “the student business services office, and also work in the marketing department...I am working with the university on the production of posters, flyers, commercials...it’s great having a real experience of marketing under my belt” (Hope, interview, 3). By the next summer, Hope had pursued another job opportunity to work with

a local music festival and also working in a music studio. She was able to integrate marketing and music – two professional interests in her life (Hope, interview, 4).

Even as early as her first semester in college, Jane explained that for her, academics was not purely the reason she was in college and believed that college was “limited in what it can teach me” (Jane, interview, 4). Jane explained, “I’m going to do what I have to do to get a degree, but in the meantime...I will be planning some great extra-curriculars...and I think these are the things that will help me get a great job, and point me in the right direction” (Jane, interview, 3). She was involved in a business honors fraternity and an a Capella group and took on time-consuming leadership roles for these groups. Jane was continuously seeking out opportunities at a host of organizations, groups, and internships. She researched “working at a record company over the summer, or applying my work study toward the music society at school as one of the program directors” (Jane, interview, 5). By the summer of her freshman year, she was working with an International Jazz Festival in another large Midwestern city (Jane, interview, 4). Also, that summer she was thinking about next steps for the following year and other organizations to apply to during, what she called, “internship application season” (Jane, interview, 4). It seemed like a furious pace of determining next steps on the path for professional experiences.

Michelle continued to work nearly full time as she transitioned between academic institutions. Her close work and managing in a coffee shop made her interested in small business management as a potential career. She explained, “I manage and train new baristas, I can take care of closing out the register and some of the accounting. I go with [the owner] when we are doing purchasing and inventory. I really know a lot about it” (Michelle, interview, 4). Cassie worked in a restaurant after leaving her original university,

but was applying to work with different film organizations and maybe with the [local art and performance theater] in town, which would help in her understanding of film and presentation to audiences. Jennifer was simultaneously engaging in her career and her education through the Marines; however, her pursuit of the Naval Academy demonstrated her desire to construct her own path through the military that satisfied her academic and service goals.

Students demonstrated how they crafted and constructed different extra- and co-curricular experiences of college to learn within the domains they wanted to enter. When the science learning lacked collaboration or authentic lab-based experiences, natural science students sought them out. When social science students did not engage in collaborative inquiry with other colleagues, students became meaningful members of their different organizations and groups and used practices they believed would be a part of their future careers. The specialized skills required within domains became a core part of the work in these constructed experiences. Students engaged in writing, reading, presenting, discussion, and goal-oriented work, all aspects generally lacking from their coursework experiences. Further, students showed deftness in constructing these experiences. They leveraged their social and cultural capital to established these opportunities, to be sure; but, they also used skills of navigation and their sense of agency to establish meaningful experiences – they did this as a way to supplement the domain-specific skills they felt were not a part of their course learning in college.

What does it mean to navigate and be “ready” for college?

This chapter presented the various ways students *navigated* and *constructed* their experiences within and across courses, within and across institutions, and within their

desired future domains. Findings from this chapter illustrated the proficiency of these students to navigate and act as agents of their own learning and outcomes. Navigation, in the data presented, looked like students seeking information and clarity from professors and instructors to support their own learning in disciplines and domains. This provided them more nuanced information about how to approach assignments, interpret and understand concepts, and succeed in classes. To be sure, there were other instances of navigation in which students engaged. Some students engaged with peers and classmates to work on problems and homework to interpret approaches. Others used resources like the writing centers in college and even parents to interpret and navigate the work of college. The strongest pattern of navigation, though, was the use of office hours, but I would be remiss not to mention that students also sought information and advice from other sources. Given their varied experiences and their stark differences in academic experiences between support in high school and in college, I wondered what their interpretation of their learning, their skills, and their navigation would be. In this section, I present themes from students' interpretation of college readiness and what college requires of students.

I asked students "what advice would you give to someone about what it means to be college ready?" Wyatt offered his advice by saying "in some college courses, and especially in science, college courses are purely exam based. In high school we had exams, and challenging exams. I was used to it. But it wasn't the main source of grading and or the main thing you thought about. That was a bit of a change. I felt ready for it, but I definitely am glad I didn't have pure exam classes in high school. I just didn't know [that it was like this in college]" (Wyatt, interview, 4). Related to learning and studying, Ryan explained that to be prepared for college students should know that they will "read a lot in textbooks" and

“talking with professors a lot to understand [material]...it may be aggravating at the time, but it isn’t a loss because when you are confused....things are definitely not clear a lot of the time, but you should go to office hours to clear it up for yourself” (Ryan, interview, 6).

Wyatt described how exams tend to dominate the assessments of college and he privileged this advice above others to tell to prospective students – this indicated a strong sense of how pervasive exams were in his academic reality. Ryan echoed findings in chapter five and in this chapter by emphasizing how much textbook reading occurs and illustrated a sense of agency in explaining how important it is to seek assistance from professors when you are confused.

However, the most commonly reported theme across student responses about advice for college readiness was that a person attending college had to be ready to be “independent” and know “how to learn independently,” which was an interesting conundrum given students were in institutions meant to aid and develop student knowledge. Students explained independence meant, at times, managing their time and knowing how to complete their work. However, another explanation of independence indicated that it is necessary to know that sometimes professors and school were kept at a distance and did not form personal relationships with professors. Andrew described that in college “You're much more disconnected from the professor. You can still maybe talk to them after class, but it's less personal and more like reading a textbook, I would say” (Andrew, interview, 5). Jessica expressed similar sentiments about college preparation and how to navigate the environment. She said, college has this “ ‘go figure it out yourself attitude” (Jessica, interview, 4).

A few students reported that they felt in college professors do not know you or necessarily care about you. Hope described this by saying, “It is a lot different from high school. At least in some of my classes, and some professors in particular, they don’t care. They don’t care if you come to class or not. They don’t care if you are failing. I had to teach myself everything about the class” (Hope, interview, 3). Jessica expressed frustration about college and the kinds of relationships that were formed (or not formed) with professors, which to her, was the reason she went to college to learn. Jessica said, “in some engineering classes professors were helpful, but then in many other classes professors don’t even know or care to know your name. I had to get a sheet signed for the first month and a half that said I came to class for ROTC. My chemistry teacher still didn’t know who I was the last day I got it signed. I thought, ‘wow, every single day I come to class, but you really don’t care at all about me’” (Jessica, interview, 3).

The feelings of disconnection, of lack of personal relationships with professors and instructors, and the feelings that learning was an independent endeavor were experienced by students who possessed agency, privilege, and who possessed social, cultural, linguistic, and academic capital. These feelings spanned institutions, majors, and reported, by each student in the study. These students were “ready” for college, they enjoyed school, and were dedicated to learning. And, *they felt* this way. What does this mean about the students who are historically marginalized in academic spaces? How will students with less of a sense of agency and less navigation skills engage in the college environments that require such independence?

The students’ experiences of disconnection and independent learning need to be reconciled with the evidence that students met very frequently with professors and

instructors—they were not in fact independent when they made use of these sources. So, why did they feel this way? As the evidence from office hours illustrates, professors were willing to engage with students and described, and encouraged on countless course materials, their availability at office hours and over email. The eleven students in this study made almost constant use of this time with professors. It is not my belief that professors did not want students to learn or that professors did not care about the students that they taught; in fact, I documented many instances from carefully constructed syllabi and course materials that suggest just the opposite. So, what to make of the students' feeling of disconnection, independence, and, at times, confusion? The experiences in office hours were self-directed and sought out by students, and in this way, students likely saw this as an independent move toward gaining knowledge and clarity on assignments and concepts. This information and knowledge was not provided to the class writ large and instead was independently uncovered by students. What precipitated office hours meetings was the confusion on assignments, topics, or about grades, which is likely another source of how students interpreted their experiences. The possible lack of explanation and exploration of purpose and inquiry in their courses to organize the reason for the work and skill to engage with the work—why are students studying a topic? How do disciplinarians interpret these topics, and how can students develop skills to interpret and construct meaning?—may have resulted in students constructing this meaning-making themselves by using lecture materials and textbook material and organizing it for themselves, without the aid of the professor or in ways that made these practices visible to students. Students were attempting to construct their own frame from the transmission models of instruction they were most commonly experiencing, which stood in contrast to the experiences they had in

high school when inquiry frames and disciplinary literacy guided much of their experiences. In sum, positioning students for participation within and across domains and engaging in collaborative (not transmission style or only for exam preparation) problem solving, reading, interpretation, would likely shift students' interpretation of their experiences in courses and with professors from feelings of confusion, lack of support, and independence to experiences of apprenticeship, shared practices within domains, and positive relationships. What teaching approaches and assessment styles might professors need to employ for all students to have access to the knowledge and insights offered in office hours to these particularly privileged and agentic students? Using these students' stories and experiences may provide insights into the shifts necessary to involve and position all students toward meaningful disciplinary participation and understanding.

Conclusions

College readiness literature, especially literature attempting to broaden the definitions of readiness, describe that readiness can take many forms and involve many skills for success in college (e.g., Conley. 2007). This dissertation has explored the ways that students were prepared and ready (or not ready) for the academic experiences of college. However, readiness certainly also includes aspects of financial readiness, linguistic readiness, socio-emotional readiness. Students navigated and acted agentially across spaces of college when they possessed many of these aspects of readiness. When they did not, navigating became more difficult because of a variety of factors – students had preconceived notions and pressures about success, students may not have felt they belonged, they did not feel like they could afford school given the experiences they were having, they did not believe that college gave them skills they would need for their lives in

the future. Central to the tension of college readiness is the position of the student in relation to the institution and their educational experiences. In this chapter, I provided instances of students navigating across spaces and advocating for themselves and their success. However, the barriers and rigidity were also evident, as observed in the alternative path case studies of Jennifer, Cassie, and Michelle.

Throughout the stories of students' navigation, I thought "was college ready for them? Did they accept the students where they were, and did they know their students or who they are as people and what they need as learners? Did college and professors know the other students in their courses and what they might need to productively engage in college?" One story illustrated the tensions I noticed within college and how this was understood by individual students. Jane explained:

...actually enjoyed economics in theory, but the way it's taught at the university it is like, to get you to fail. It is a "weeder" class. It is so stressful to be in class where you want to learn, but it is being taught in a way that almost makes you feel like they want you to fail...trick question on the exam. A huge class where you don't discuss anything or have relationships. It felt insensitive and counterproductive to learning. (Jane, interview, 4)

Jane recognized that the way learning in economics in college was conceptualized was not, in fact, the way that economics actually operates or even the necessary way that one must learn economics. She saw this as a stressful environment that was not conducive to her learning or her goals. This class did not include human "relationships" and felt "insensitive." When there was a death in her family, Jane wrote her economics professor about this occurrence because the funeral was held on the day of an exam:

Jane: ... I wrote my econ professor the most heartfelt email to ever touch this Earth and he just responded, "Okay."

Bridget: What did you have to write him about?

Jane: Um, there was an exam the day of my great-grandfather's funeral, so logically, I asked if it could be moved and he said no. So I drove myself home from [the city of the funeral over two hours away] in a rain storm, and took that exam at eight p.m., the day of a funeral...he was like, "I didn't write an alternate exam. I think it's unfair to give you that exam at another date." I was like, "Okay. That technically makes sense, but are ... Really? Like, you're going to make me take an exam the day of a family death?"

In Jane's experience, she was in a course known for rigidity and inflexibility, what she called a "weeder" course, designed to have students fail and struggle. This professor (and by default the larger university) communicated to Jane that exams and the maintaining the schedule of this exam was more important than her experience with a family member's death. It is an extreme but true example that others also likely faced. Other students may have taken this in a more personal way, or maybe would have never asked for an exception and instead struggled in other ways. As it relates to domains and conception of knowledge, this professor possessed quite a narrow conception of knowledge, of assessment, and of the purpose of this course. Flexible teachers seeking to convey and support disciplinary understanding, but also intellectual development, would recognize that there is no sense in forcing a student to take an exam in emotional turmoil. Instead, this professor viewed the exam somehow as infallible, unable to be recreated or reassessed in other ways. Jane returned from her grandfather's funeral and took the exam as scheduled and told me she scored much more poorly than she wanted on that exam.

In a larger view, what does this experience and many others described in this chapter mean about what students need to be "ready" for in college? Should students be ready to navigate independently be ready to be in a school where professors at least allow the perception that do not know students well or know what students need to engage in domains and disciplines meaningfully? Should they be ready to take tests, have confusion

about grades, and have to navigate and act as an advocate of your own learning?

Conversely, I ask, are these experiences what colleges wish for students to experience and is this what college mean by readiness?

Without a doubt, the students in this study were privileged in a host of ways and also had skills that allowed for their ability to engage in navigation of resources available to in order to construct disciplinary and domain-specific experiences. Not all students possess these skills or resources. As I conclude this chapter, I continue to ask regarding the students in this study, *what were they ready for? And were their colleges 'ready for' them?* At the center of these questions, exists the gaps and tensions that these eleven students' experiences helped to expose.

CHAPTER VII

Conclusions and Implications

In this dissertation study, my goals were to describe the disciplinary literacy experiences that well-prepared, “college ready” students experienced in high school, and how these experiences compared to the academic tasks and language-based learning in college. I also sought to develop a nuanced understanding and description of what is meant by “college-readiness” by analyzing how students navigated the academic learning of college using many of the skills and approaches developed in high school.

To review, the research questions that guided my study were:

1. How were the eleven “college-ready” students prepared for their college experiences during high school, in a context that used disciplinary literacy teaching and learning approaches within and across domains (as called for by many K-12 standards-based reform documents)?
2. What were the academic tasks and texts (i.e., the features, requirements, demands) these students encountered during the first two years of college?
 - a. What were the difficulties and challenges posed by the academic tasks in college?
 - b. To what extent did these tasks depend on disciplinary literacy skills?
 - c. How did the structures of college learning promote or restrict disciplinary practices and interactions?
3. How did students navigate the various academic challenges, language-based learning experiences, and difficulties they encountered in college?

Summary of Findings

I conducted this study because I thought that in studying students who met all aspects of college readiness I would capture the experiences of students gaining increasingly sophisticated disciplinary literacy practices from high school through college. What I found, however, told a very different story about the nature of college learning and teaching. Within many of the domains (with the possible exception of English and the humanities) and in a majority of the students' courses, evidence of learning and teaching using disciplinary literacy and disciplinary inquiry was limited. In the majority of the courses these eleven students took, their experiences and engagement in college was dominated by exams, lecture, and textbook reading, which are approaches that do not adequately support students to develop the kind of flexible literacy skills required of today's realities (e.g., NRC, 2000, 2005). Most important, within the areas that students sought to specialize and major were also the courses where these students experienced the least disciplinary engagement and inquiry, so although they may have experienced instances or individual courses of disciplinary engagement, this was not the most prevalent or influential experience.

However, in high school the eleven students in this study experienced disciplinary literacy learning opportunities across domains. As a part of their regular engagement, students were positioned to engage in disciplinary inquiry using multiple, complex, and disciplinary texts to investigate problems relevant and true (in developmentally appropriate ways) to the disciplines in which they were studying (e.g., Moje, 2015; RAND Reading Study Group, 2002). Students were also positioned as "newcomers" and

apprentices into the disciplines, and as people who could ask and answer questions within domains and continue to gain disciplinary skills to engage in even more sophisticated ways over time (Lave & Wenger, 1991). One way that students were positioned to engage in this disciplinary literacy learning and inquiry was through choice and as agents in their own learning (e.g., Moje & Lewis, 2007). Students were able to ask questions of their own making, investigate problem spaces that mattered to them, and use their ideas and backgrounds as a part of disciplinary learning (NRC, 2005). In this way, students gained disciplinary dispositions as capable learners, communicators, and thinkers within the domains they were studying and developed a sense of agency within the disciplinary communities.

The teachers at Pine Ridge School recognized the importance of disciplinary skill development and supported students by serving as “oldtimers”/disciplinary experts (Lave & Wenger, 1991) or a “more knowledgeable other” (MKO) as described by Vygotsky (1978) within these disciplines. Viewing themselves as apprenticing students into the domains meant that high school teachers were less likely to use a transmission approach to education (e.g., Mayer, 2002) and instead saw the teaching and learning as doing something necessarily disciplinary and inquiry-based (e.g., NRC, 2000). Teachers provided disciplinary tools and scaffolds on projects to support students’ disciplinary literacy engagement. The examples of texts, projects, writing, and tasks illustrated the kind of rich, disciplinary, and inquiry-based teaching and learning for which many standards-based reforms are calling (e.g., CCSSO, 2010; NGSS Lead States, 2013; NRC, 2012).

With these developing disciplinary “toolkits,” practices, and experiences in-hand, these eleven students enrolled in seven different higher education institutions across the

country. What they encountered in college, at least within the majority of their courses, was a stark contrast to the learning they had experienced in high school. The majority of the students' college courses were dominated by *telling* and *testing*; students reported rarely engaging in inquiry activities within their courses. Instead, across the 182 college courses that these eleven students took in two years, the majority of students' grades, across domains (with the exception of some courses in English and the humanities), were determined by individual, timed, mostly "objective-style" exams (i.e., multiple choice, fill-in-the-blank, short response).

I also found that within domains of college—specifically within the natural sciences and the social sciences, which were students' chosen major areas—students encountered specific assessment-types and course structures that limited the amount of inquiry, participation, and use of disciplinary literacy practices. For example, students majoring in the natural sciences had even more heavily-weighted exams as a part of their courses: Nearly eighty percent (80%) of their grades depended on exam performance. Lab-based courses, those courses that one may think to be collaborative or encouraging of scientific practices, were highly prescriptive and routinized to the point that many students reported being bored and reported feeling that they had to learn about "real" science practices outside of their coursework.

Within the social science domains, the social science majors in the study had close to fifty percent (50%) of their grades based on exams and one-quarter (25%) based on papers. As has been mentioned, for these eleven students, if they were writing papers in college it was likely that they were writing them within the social sciences, as these courses were the most frequently taken by students with a paper or project component. (Other

courses that often included papers—English and humanities—were only taken by a few students and with far less frequency.) As they engaged in their paper writing, social science majors reported feeling uncertain about how to construct and write different types of papers for their courses. This was likely because paper assignments in social sciences often lacked disciplinary tools and scaffolding or frame that would support students to “see” the approaches to specific language, particular writing structures, and models for different genres or styles of writing that are specialized practices within domains. Of course, I did observe and document instances of disconfirming cases, or those courses that served as exceptions to this dominant pattern. I did observe instances of powerful learning and teaching across domains, as was noted in the rich examples presented as disconfirming cases. About half of the English and humanities courses that students from this study took (8 of 17 courses) used disciplinary texts and inquiry-based projects supported with scaffolding and disciplinary tools. The other half the English and humanities courses were also organized in transmission style formats and with non-inquiry-based projects and papers. It may have been the case that if students had taken more courses (within some domains) that included disciplinary inquiry and literacy learning approaches, their experiences may be much different. The preponderance of evidence indicates that the vast majority of students’ courses were organized as *telling* and *testing* formats, and without the necessary supports (or instruction) for students to engage in disciplinary literacy practices. The findings of this study indicate a prevalence of transmission styles of teaching and teaching as telling, but also provides images of what is possible within the other courses and disconfirming cases that were documented.

When these eleven students were confronted with confusion, difficulties, or lackluster experiences in college, they *navigated* these experiences using their agency, privilege, and social and cultural capital (e.g., Maxwell & Aggleton, 2013; Moje, 2013; Moje & Lewis, 2007). When confronted with this confusion they sought clarity from various resources, but most frequently from their professors and teaching assistants by attending office hours. Students reported attending office hours regularly to navigate their academic learning and to request clarity on papers, projects, and exams; they attended office hours to discuss and refine ideas about content, as a way to monitor their own learning, and discuss grades. The instruction and support students experienced in office hours and individually from professors revealed some of what they (and likely their classmates’) needed to be provided within the course itself. The confusion often stemmed from a lack of clarity of purpose of assignments, poor feedback from professors/instructors to students about their work, and a lack of disciplinary supports to engage in the tasks within the courses. As one example, in a social science course on gender studies, Shyloh was asked to write a literature review, and they faced confusion about the structure and style of a literature review and wondered if it “should have a thesis statement” (Shyloh, interview, 5). Style, writing approach, organization, and language use within this genre and within this domain had not been foregrounded in this endeavor. Scaffolding and disciplinary tools were needed to support more confident and informed engagement in this writing task.

I also found that these eleven students engaged in navigation at the institutional level as students. In particular, a case of three students—Cassie, Jennifer, and Michelle—attempted to navigate college and assess issues of future goals, cultural fit, and addressing academic difficulties as they encountered the realities of college learning. These three

students experienced enough difficulties and lack of connection, purpose, and support in college that they ultimately left their academic institutions. Last, when these students were confronted with lackluster disciplinary experiences in courses, they constructed their own extra- and co-curricular opportunities to learn more within their domains. Attempts (successful and not) at navigation and construction were enacted using students privilege, agency, and social and cultural capital (Bourdieu, 1986; Bourdieu & Wacquant, 1992; Maxwell & Aggleton, 2013).

The majority of students' courses being transmission styles of education, students' sense of confusion in their academic work, and students' frequent need for navigation of academic learning, raises considerations and questions about the conception and meaning college readiness. What is expected of students in regard to readiness? And, what is expected of colleges, professors, and instructors to support students?

General Conclusions

As was described at the outset of this dissertation, the intention of studying the experiences of "college-ready" students from high school into college was to enact the recommendation of Bruner (1983) who applied a dictum of William James that if one wants to study religion, "one should study the most religious man at his most religious moment" as a way to understand active possibilities and experiences (p. 15). These students represented "good cases," as described by Shulman (1986) – opportunities to understand not just what is probable, but also what is possible. Spurred by calls for improving college and career readiness, discipline and subject-specific standards have called (and are holding K-12 teachers accountable) to provide the kind of teaching that supports research-based

learning and development theories (NRC, 2000, 2005). In high school at Pine Ridge School, students in this study routinely engaged in the disciplinary, problem-framed, inquiry-based, and complex tasks and text use that standards are calling for in education today (CCSSO, 2010; NGSS Lead States, 2013; NRC, 2000, 2005). The eleven students in this study carried a range of disciplinary dispositions, disciplinary literacy practices and skills with them to college. Once in college, however, what students experienced as a part of their higher education learning experiences points to larger issues about the meaning of college readiness as well as the purpose and intent of postsecondary learning in the U.S. today. To be sure, these students' experiences were colored and shaped by a host of influences, including the courses they took, their majors, their interests, and their backgrounds. However, despite these influences, it was startling how much of their experience involved *testing* and *telling*, a transmission model of teaching and learning (Mayer, 2002; NRC, 2000), particularly evident within their natural science and social science courses (the most frequently taken courses among these students).

To understand the variation in experiences across these educational spaces from high school to college and over time, I again draw on Moje's (2015) heuristic of disciplinary literacy teaching and learning, called the "4 E's." At the core of disciplinary literacy learning is the active *engagement* in the inquiry cycles of the disciplines. Disciplinary inquiries and use of disciplinary literacy practices are supported by teachers' ("old timers," [Lave & Wenger, 1991], experts, more-knowledgeable-others [Vygotsky, 1978]) *engineering* of these learning experiences, which allows students to construct and produce knowledge within domains. Students are supported through disciplinary tools and teacher's *engineering* to *examine* the language of the disciplines and *evaluate* the function of language

within and across domains. During high school, the disciplinary engagement (Moje's first "E"), imbued most the experiences the students had across domains. Through the students' interviews, the department leaders' descriptions, and the curricular artifacts, the central focus of inquiry within and across disciplines was noticeable. Recognizing they were not yet independent disciplinarians, teachers provided developmentally appropriate disciplinary tools and scaffolds to support students in their disciplinary inquiry so as to provide access and development of disciplinary practices over time—what Moje (2015) calls *engineering*. These supports provided instances of *examining* and *evaluating* language within and across domains, as evidenced in the examples of students' scaffolded learning tasks in chemistry, calculus, and English when students produced and analyzed language, used inquiry practices, engaged in writing, discussions, and presentations within and across the domains and for various audiences.

By contrast, in the majority of their college courses, students rarely engaged in disciplinary inquiry in their courses. More often, students learned *about* the knowledge held in a domain and learned *about* the ideas in a field, but rarely *engaged* in these practices. In college, it seemed that instruction promoted a *telling* and *testing* approach to knowledge instead of approaching the learning opportunities of students from an inquiry and engagement approach. Without inquiry or engagement in a problem-solving approach in a discipline, it is not surprising that professors may not feel the need to *engineer* or scaffold access to much within the domain itself. Textbook reading, memorization, and lecturing are learning experiences that require less student construction and production within the domains. Students also reported rarely spending time closely *evaluating and examining* language or writing, speaking, discussing, or reading with these specialized

disciplinary approaches in mind. When the few disciplinary engagement activities and inquiry occurred, the learning activities often lacked necessary supports for students to navigate the task productively (e.g., Pea, 2004). Students reported confusion with why they were engaging in certain tasks, how to engage in these tasks, and what structure, approach, or practices they should use to do the task. As one example, Ryan reported meeting with his ethics professor regarding research-based writing assignments during his first year in college. His confusion stemmed from “not having a lot of guidance on the paper” and sought clarification on how to write a paper in ethics. He reported knowing that logic mattered in an ethical argument, but was not certain of this structure or language to communicate this logic. Juxtaposing this with the supports students received within the English course in high school, which included clear, disciplinary language- and practice-oriented rubrics, supports and process work for organizing complex arguments, and a detailed suggested drafting and revision schedule. If students required many of these disciplinary tools and supports a year prior, more than likely these students (and many of their classmates in college courses) needed some version of these supports (focused on advancing their developing literacy practices) in college as well. In the face of a lack of supports, students navigated these confusions and questions by seeking information directly from the professors of their courses. But, what of students who remained unclear about the disciplinary language and research-based approaches to writing in these domains in college (or who may not know that writing across domains may vary in specific and specialized ways)? What of students who did not know that attending office hours was a way to remedy these confusions? How can these supports be integrated into college

courses (and fade over time) so that all students have access to scaffolds and supports they likely need?

Analyzing experiences at the task level across both high school and college reveals another interesting example of disciplinary literacy learning (or the lack thereof). The RAND Model of Literacy and Comprehension argues that it is in the relationship among the text, the reader, and the activity that meaning is formed and knowledge is advanced (RAND Reading Study Group, 2002). In these students' high school, the relationship of the text, the task, and the reader seemed central to how learning experiences were designed and instructed. Students were known by their teachers and teachers enacted supports and scaffolds to meet the needs of students (Palincsar, 1998). The texts were used in the service of the inquiry tasks and to engage students in making meaning, producing, and constructing knowledge. The texts were disciplinary and the problem frames of the inquiries were driven by the discipline, necessary components of robust learning structures (NRC, 2000). In college, I posit that this triadic relationship may be the source of some difficulties or lack of realization of disciplinary literacy learning. In the examples across courses in college within students' major areas (natural sciences and social sciences), it seemed that often professors were less aware of their students' knowledge, their literacy needs, the skills they brought to college, their interests, or their backgrounds. This seemed to be the case when supports or scaffolds were non-existent when they were desperately needed by students, or at other times, when learning experiences were so prescriptive that it rendered the experience boring or formulaic. Although textbooks sometimes dominated learning in domains, the additional texts selected by many professors were robust, challenging, disciplinary, and interesting to students. The difficulty

came in accessing the texts and knowing the purpose (or frame) used for reading. At times students reported struggling with the reading load, the language, or the structure of different texts, again likely due to a lack of disciplinary tools that surround the texts themselves. Finally, the purpose for the text use—the activity—was also at times unclear, unscaffolded, or not inquiry-based. The most prevalent example across domains, the use of textbooks to study for exams, illustrates how the student became a passive consumer of knowledge and was not positioned within the domain as making meaning with texts or learning deeply about the practices within a domain. A rich text without a purpose for reading can be equally as confusing or irrelevant (NRC, 2000, 2005; RAND Reading Study Group, 2002). The triadic relationship of text, activity, and reader provides a useful illustration of the importance of considering all of these aspects when colleges and professors design learning experiences within and across courses.

I do not mean to claim that students' experience of confusion and dominance of lecture and testing was across every experience and every course. This study was influenced by the courses students took and the major areas they pursued. I observed courses that included helpful disciplinary supports, interesting projects, and inquiry. However, these instances were not the dominant experiences of these students. Had students majored in other areas or pursued other fields of study, their experiences may have differed. *Telling* and *testing* and feelings of confusion and purposelessness occurred often enough—and in the students chosen fields of study—that it became an important pattern to examine and investigate.

The conclusions of this study prompt two large, important, and interrelated questions about college readiness and disciplinary literacy learning. First, how is it possible

that *these* students, with such a large amount of cultural, social, linguistic, and academic capital, experienced confusion and difficulty in college? And second, why did they experience such different learning from high school into college (in at least a majority of their courses)? I argue that the stark difference in learning experiences from high school into college is the result of how the field conceives of college readiness and college learning (e.g., Conley, 2007). College readiness, as it is often portrayed within standards documents and popular media, implies the capability and independent engagement by students once in college. If this notion is accepted, disciplinary tools, supports, and scaffolds are less likely to be viewed as necessary by professors and instructors—students should be ready to engage in the work without such aids. Further, it positions students not as novice apprentices within domains, but as independent operators, and instructors, therefore, may not view their work in teaching as apprenticing students into the domains.

These eleven students entered college with a robust experience within and across domains developing disciplinary literacy skills as a result of their high school literacy engagement. Just as I justified the use of these students' experiences as "good cases" of the possible, these students may be the ones who needed the disciplinary engagement in college the least. Students had, in many ways, developed disciplinary skills, practices, and dispositions in high school. The time and learning opportunities provided students access to the processes and approaches to constructing knowledge in domains. Students regularly questioned knowledge within domains in high school and therefore continued to question knowledge in college. In high school (and likely earlier) students learned how to navigate their own learning, how to interpret texts and tasks, and how to recognize what they needed to engage in tasks across domains, and so they brought these skills with them to

college. Without these skills, I argue we would not have observed students engaging in navigation or construction, and students may not have even *known* they were confused about different tasks and texts. They were prepared well enough to know when they were uncertain of how to approach a specialized text or task and also recognized when a learning experience was falling short of possible complexity.

But, what about the students who did not have disciplinary models as a part of their high school learning in their high school? What about students who received subpar opportunities to learn or develop domain-specific literacy skills in high school? What about the students trying to navigate college with fewer resources and less cultural and social capital to support them in knowing how to do this? What about the students who came to college to not only learn *about* disciplines, but to learn how to engage *within* disciplines? What about students who would not know to supplement one's college learning with "real-world" opportunities within a specialized domain because these opportunities will be lacking in college? What about those students who possess few resources to supplement their learning? For these students, as Gee (1990) described, disciplinary practices, literacies, and inquiry approaches remained tacit and inaccessible. Even while at colleges and universities, students are kept separate from the practices of the disciplines, at least in most domains, as most of their engagement would take the form of memorization, test-taking, and listening to lectures.

By studying these privileged and "college-ready" students' experiences, I sought to highlight the necessary changes within K-12 and higher education as it relates to learning experiences and conceptions of college readiness. In what follows, I offer the contributions

of this study to theory and research and the implications of this study for future directions of study.

Contributions to Theory and Research

This study provides extensions of educational theories and empirical research in three major areas: (a) in providing a case of disciplinary literacy learning in a high school context; (b) in the realities of college learning especially among those well-prepared for college; and, (c) in the interrogation and refinement of the concept of “college readiness.”

A Case of Disciplinary Literacy Learning in High School

Disciplinary literacy theorists have investigated the nature of disciplinary literacy practices across domains, largely using descriptions of expert disciplinarians’ practices (e.g., Lee & Spratley, 2010; Moje, 2007; Rainey, 2017; Shanahan & Shanahan, 2008; Wineburg, 1991). Many of these practices have been integrated and adopted within current K-12 education standards-based reform efforts (*CCSS, NGSS, C3 Framework*) beginning to permeate K-12 classrooms. Disciplinary literacy learning supports learners in the use of these disciplinary practices and literacy skills within the context of inquiry (e.g., Moje, 2015). Researchers have considered what this disciplinary literacy learning might look like within single classrooms and/or single domains, including in history classrooms (e.g., Bain, 2005; Monte-Sano, 2010), in mathematics classrooms (e.g., Draper & Siebert, 2004), science (e.g., Norris & Phillips, 2003; Roberts, 2007; Roth & Lee, 2004), and in literature (e.g., Lee, 2004; Peskin, 1998; Rainey, 2017). However, researchers have not yet presented what an integrated model of disciplinary literacy curriculum across courses and domains within the context of a school might look like, although there are promising models of

interventions across multiple in school contexts (e.g., Goldman, et al., 2016 [Project READi]).

My analysis of the high school context of Pine Ridge School offered insights into the design of disciplinary literacy learning opportunities across courses and domains. Using Moje's (2015) heuristic on disciplinary literacy teaching, I documented the texts and tasks used for disciplinary inquiry and examples of scaffolding provided by teachers to support these endeavors. Students asked, answered, and developed pursuable questions within problem frames that were reflections questions and inquires that matter within the disciplines in which they were studying; further, students were supported and scaffolded to engage in reading, writing, thinking, discussion, collaboration, and other inquiry approaches across domains.

The case of Pine Ridge School also demonstrated the important and necessary orientations and dispositions of teachers as they engage students in disciplinary literacy learning. First, teachers viewed themselves as disciplinary experts ("old timers") and as scientists, mathematicians, historians, and scholars themselves and viewed the classroom as a disciplinary community of practice (Lave & Wenger, 1991). In this way, their apprenticeship of students was as disciplinary insiders and positioned students to work alongside them as they learned to enact practices and engage in inquiry within the disciplines and domains (Lave & Wenger, 1991; Vygotsky, 1978). Teachers also provided scaffolding—what Moje labels *engineering* in her 2015 heuristic—to support students' engagement. Teachers' engineering and scaffolding took the form of disciplinary tools and guides that drove inquiry. This scaffolding allowed meaningful engagement but also allowed students to engage in more than they would have been capable of independently

(Wood, Bruner, & Ross, 1976). As a result, students developed disciplinary dispositions and agency as they were positioned as capable of doing the work of the discipline. Viewing this high school context, the shared philosophy and intention of teaching in disciplinary relevant ways, provides an example of how a school might construct these experiences for students across domains, across courses, and over time. Other scholars have argued for models that illustrate not just a “slice” of students’ experience within a specific domain, but instead among the various domains they navigate (Moje, 2013; Stevens, Wineburg, Herrenkohl, & Bell, 2005). Moving across courses of high school with students experiencing these disciplinary literacy practices illustrates the possibilities of student engagement in tasks called for by standards documents and theorists alike.

Moje’s (2015) heuristic represents the importance of *examining* and *evaluating* disciplinary language. *Examining* refers to close analysis of language symbols, words, structures, and other details of language within domains, and *evaluating* refers to understanding why and how language choices are made in domains and across domains. Because the students were experiencing disciplinary literacy practices and language across domains, they were exposed to the differences among various domains – even those as closely linked as domains within science. Andrew’s description of the differences between physics communication and chemistry analysis provides but one example of this examining and evaluating from his Pine Ridge School experience: “In physics...we write explanations; for example, why is this true? Or is this true, give an explanation as to why....and writing in chemistry is different as well – you have use specific kinds of language and nomenclature in chemistry to explain reactions or explain phenomenon at a molecular level” (Andrew, interview, 2). This indicated that Andrew, in high school, learned and experienced that in

physics the intention of writing is proving and observing phenomena – forces – in nature and their actions and reactions. In chemistry, Andrew knew the approach to writing and problem-solving is to illustrate, using specialized nomenclature, the invisible (to the naked eye) atomic-level features and as a way to show the reactions that occur at a molecular level. Without *engaging* in writing, reading, thinking, problem-solving, and inquiry within and across these scientific domains and without teachers scaffolding and supports in making practices visible to students, it is less likely that Andrew would have spontaneously arrived at these same conclusions. Certainly, there is more work to be done, in particular, uncovering the ways that students develop and refine their understandings of practices across domains of high school and how they borrow and navigate the literacy demands within inquiry tasks. This study offered one case of high school disciplinary literacy learning among a group of students and over time.

Experiences in College Learning

As was described at the outset of this dissertation, there is little known about what happens in college courses as it relates to student learning (Dunkin, 1995; Hativa, 1997; Neumann, 2001) and there are few instances of shared vision of quality instruction, assessment, and outcomes for students in college. Large-scale survey efforts have attempted to document the learning, practices, and engagement of students in college, which relies on self-reporting and lacks the ability for nuanced understanding what it might mean when a student responds that they “engaged in paper writing,” as one example (NSSE survey). This dissertation study offered an overview of college learning experiences among these eleven students across seven higher education institutions; specifically, the

study offered images and examples of the kind of learning and tasks that students are asked to engage in over their first two years of college.

For these students the most dominant experience in college was attending lecture-based courses and studying for and taking exams for courses across domains. Within some domains, writing and projects were more emphasized like English and humanities, but represented only a very small portion of the experiences of college for these students and were not the domains in which students were seeking specialization and majors. Overall, I found that these eleven students rarely engaged in disciplinary inquiry as part of their college learning. These findings, to be sure, were driven by the courses that students took most frequently (natural sciences and social sciences) and may have been experienced differently had students majored in other areas of study.

The findings of this study are consistent with other large-scale investigations of critical thinking and knowledge outcomes in college. Arum & Roska (2011) documented a lack of critical thinking gains among almost half of the population in college over the first two years of college. These authors attribute the lack of critical thinking gains to the lack of rigor in college: students read and write very little in their courses, and when these literacy practices are more present there are more gains among students with these experiences. For example, students majoring in the liberal arts had higher gains than students in other majors; however, the authors argue these gains are likely the result of increased reading, writing, and reasoning across multiple courses, which represents teaching and learning activities that were less likely to happen in other domains (Arum & Roska, 2011). In this study, the eleven students also experienced variation in the requirements to read and write, the texts that were used, the structures of their courses, and the tasks in which they

were asked to engage. Consistent with the findings of Arum and Roska's (2011) study, I posit that the transmission model of lectures and exams across many domains and courses that the eleven students in this study experienced limited the amount of critical thinking, inquiry, and disciplinary literacy learning.

The students in this study were seeking to specialize within domains of natural sciences and social sciences. Within these courses, students were less likely to use inquiry, exploration, collaboration, or discussion in college. This illustrates how students were kept outside of domains and communities, even those in which they were intending to specialize. Foucault's (1977) warning about reifying disciplines to the point of inaccessibility seems pertinent especially considering and these students, even with enormous privilege and background skill, still experienced exclusion and limited opportunities and structures for learning disciplinary practices in college. The disconfirming cases of courses that did include inquiry, disciplinary literacy practices, and were organized with problem frames provide models and illustrations of how they can be done well in college and across domains.

Research and reform literature is calling for increased attention to designing meaningful learning opportunities in college. As the landmark report on higher education, *A Test of Leadership*, indicated, among a great many other major issues, literacy outcomes among college graduates have actually declined over the last decade (Spellings, 2006). Additionally, there is no shortage of scholars recommending reforms in college including opportunities for interdisciplinary experiences (Lattuca, 1994; Lattuca & Spark, 2009), for "deep learning" opportunities across domains (Laird, Shroup, Kuh, & Schwartz, 2008) and ending lecture-dominated instruction (Prince, 2004), and in developing

academic literacies in college (Lea, 2004; Lea & Street, 2006; Street, 1997). In surveys of employers, future work places value skills like oral and written communication, ethical decision-making, creativity, and collaboration (e.g., AACU, 2015). These eleven students' college learning experiences do not seem to indicate intentional development of these skills through coursework.

Disciplinary literacy offers a framework by which college instructors and course designers can consider whether students are engaging in disciplinary inquiry, using texts for inquiry, examining and evaluating disciplinary language, and engaging in disciplinary-specific practices. This framework can drive decision-making on instruction inside higher education. Because college is naturally organized by domains and disciplines, disciplinary literacy learning is a logical progression of learning from high school and the kind of disciplinary standards being advanced in K-12 education. Indeed, I did document examples—albeit low in frequency—of disciplinary and inquiry-based teaching and learning that can serve as examples of how other courses can be structured and approaches to support students' engagement in the practices of the domains. Higher education environments can scaffold and advance the disciplinary practices within and offer opportunities across domains, so that as students begin deeper specialization in disciplines and in anticipation for careers they are engaging in meaningful and relevant work and developing flexible and advanced literacies to support navigation and agency. Some scholars have used structures, such as the Social Science Research Council's *Measuring College Learning Project*, to begin development tools and ways to assess students' competencies and development within six social science domains in college. This illustrates a promising direction of higher education pedagogical improvements and

support of students' college outcomes and development of disciplinary practices. However, in reading and investigating theorists and scholars who describe approaches to disciplinary learning, I was struck by the breadth of literature applying disciplinary literacy learning in elementary classrooms and the rich development happening in secondary classrooms. I was also struck by the relative lack of disciplinary literacy literature applied to higher education contexts; I argue that this same framework can serve as an organizing curricular, assessment, practice, and pedagogical tool for college learning.

Interrogation and Refinement of the Concept of “College Readiness”

To date, the construct of college readiness has been promoted and largely thought of as a fixed construct. Students would either be ready for college, or not ready for college. Readiness is, at its core, a construct that possesses curious definitions—at times too narrow and other times too broad. In its most narrow form, a student who is ready can pass college entry-level courses without remediation. (CCSSO, 2010; Conley, 2007). As this dissertation study described, this limited definition does not support the eventual complex realities of college contexts and academic learning, as not one student in this study faced remediation, but still had aspects of college for which they were not “ready.” Other researchers have expanded the notion of readiness to include a host of additional attributes, knowledge, and characteristics, including students' content knowledge, academic behaviors, and contextual awareness (Conley, 2007; Karp & Bork, 2014). These definitions, although striving for a more expanded notion of readiness, describe college readiness so broadly that it is difficult to know how one prepares for all of the demands anticipated about college life.

My analysis revealed several interesting realities and skills of these “college-ready” students and provides images of what readiness might entail; however, the students’ experiences also illustrated certain realities about college learning that K-12 and higher education alike would not want to promote as a part of what learning in college *really* looks like. The students’ experiences raise questions about what readiness means and if, in fact, we want the less-than-disciplinary experiences of college to continue and to be a part of the definition of readiness. First, students experienced a very narrow use of assessment and teaching-styles including exam-based assessment and lecture-based courses. These realities were in stark contrast to their experiences in high school and the preparation they received. This meant that students had to be “ready for” a very different approach to disciplinary learning once in college. Second, when student did have papers or projects to complete for courses, instead of purely exams, the students faced confusion and difficulties with the assignments. Students arrived in college with a host of disciplinary literacy skills and resources; however, even this background was not enough for them to navigate independently the expectations their professors had for their performance on various assignments. It was as if their professors expected them to move to a new level of development by virtue of their movement from their senior year of secondary school to their freshman year of college. Instead of being *ready to* learn, they were expected to be ready to perform at a level to which they had not yet been apprenticed. This seems to be a critical flaw in the readiness argument. Rather than being ready to move through a new level of development, supported by appropriate college-level scaffolding, it appeared that students were expected to arrive at college ready to perform with proficiency within that new developmental level. It is unclear what would have occurred in the three months from

secondary to post-secondary setting that would have made these eleven students experts at college-level learning. It is also unclear what theory of learning would suggest that learning new levels of concepts and practices in college would require any less scaffolding than such learning required in primary and secondary settings. More to the point, if *readiness* means students should be able to learn independently as a result of graduating from a secondary school setting, then why are college *courses* needed? Why would we not simply make information available to high school graduates—perhaps via the Internet—so that they can learn on their own? Attending to news outlets and popular media¹⁴ makes one aware that many people are arguing for such a thing because college has become viewed as a space—too expensive a space—of knowledge transmission and not knowledge formation. Why wouldn't one think they could obtain all of what college could offer through online lectures and online exams? If colleges and universities hope to avoid the threat to their continued existence, then they should perhaps take this question of what it means to learn—and concomitantly, what it means to teach—quite seriously. As the Secretary of Education's Report on The State of Higher Education (2006) similarly stated, "It is time to be frank....and not remain blind to the less inspiring realities of postsecondary education in our country" (Spellings, 2006, p. vi).

When faced with confusion, students navigated to find solutions using their agency, but also their privilege and social and cultural capital (e.g., Maxwell & Aggleton, 2013). these experiences may indicate that readiness, in fact, means the skills and abilities to seek assistance and monitor understanding; this navigation may also imply that readiness is the

¹⁴ The phrase "is college worth it" in a search engine generates numerous articles from the New York Times, Chronicle of Higher Education, the Washington Post, a book with the same title by Bill Bennett (former secretary of education).

willingness and skills to independently construct clarity on assignments from courses as well as engage in these tasks independently. I assert this because if these students were confused about assignments, those with even fewer literacy skills and fewer resources must also be confused, and there were few supports provided in the form of scaffolds and disciplinary tools. Students then sought information from professors during office hours. Certainly, it cannot be a plausible model that each student would seek assistance from a professor on each assignment when scaffolding and tools lacked. Of even greater concern is the question of what happened to students who did not possess this sense of agency to repeatedly meet with professors to assure that they understood the assignments or the expectations for their work. What happened to students who internalized that confusion as their own problem, rather than the professor's lack of clarity? What happened to students who did not have the time—perhaps owing to heavy course loads or work obligations—to attend office hours on a regular basis? For that matter, why should it be necessary to attend office hours to learn the goals of a course assignment? As some data suggested, professors took these students' confusions and sought to remedy them over email or through instruction to the class. But, this means that these supports did not exist before the issue was raised by these students. This provided even more indications that scaffolds and tools to support this work were lacking in these courses.

In other instances, students experienced repetition of learning from high school causing boredom and redundancy. Readiness, of course, should not mean that students would be bored in their courses. Students also had the awareness that the learning in courses was not entirely reflective nor supportive of relevant skills in the domains they wished to enter; to mitigate this issue, students sought out extra- and co-curricular

disciplinary experiences to supplement their understanding of these domains. This may mean that readiness is the ability and resources to construct relevant disciplinary experiences because the experiences in college classrooms will not advance domain-specific skills. Again, however, one must wonder about those students who do not have the privilege of time or resources or social and cultural capital to seek out such extra- and co-curricular opportunities. It is worth noting the many extra- and co-curricular opportunities offered by the universities represented in this study, opportunities such as undergraduate research programs, learning support programs, and special theme-focused learning communities, serve a fraction of any given institution's student population and that each of these extra activities bears a cost to the university and to the student. What economic and educational advantage might be afforded by encouraging better instruction across a range of university courses and not just within a small group of domains? What might be afforded postsecondary institution's if they took more seriously the idea of enhancing instruction *within* courses?

Findings from this study offer new insights into the construct of college readiness, but also offer some warnings about what should be included in the notion of readiness. First, this study highlights that college readiness is not a fixed concept and instead changes across contexts. Students may have been ready for some aspects of college and not others, ready for some domain-specific tasks and not others. It also indicates that college readiness means the ability to navigate among the various demands, professors, concepts, assignments, and structures of college. For my purposes, I defined college readiness as the ability and support necessary for students to pursue, construct, and question knowledge in a field or academic major of their choosing as they are supported by educators and

professors to pursue these goals and skill development. These privileged and agentic students were unable to pursue and construct knowledge within particular domains, they experienced difficulties and lacked support by professors and instructors in some instances, and the experiences of these students caused me to wonder about their development of disciplinary practices within and across domains during their first two years of college. To the theory of navigation, findings from this research indicate that these agentic skills allow for students to seek clarification, monitor learning, and construct learning experiences for themselves. Navigation becomes an essential component of readiness because without these skills students would have continued with confusion, less explicit understanding of expectations, and fewer insights into intention of assignments in college (e.g., Moje, 2013). But, what of the experiences of these well-prepared students in college? Instead of only considering what students were *ready for*, maybe we should consider what colleges and instructors should be *ready for* in anticipation of supporting students disciplinary development? The experiences of the students in this study call for a shared responsibility for professors and colleges to learn more about the students they are serving, what they know, who they are, their goals, and what skills they possess. College students were not entirely ready for fully independent work, nor should they be. College is meant to continue to apprentice students into these domains. To do this, scaffolding and apprenticeship is still a key aspect of college learning and without knowing students—their backgrounds, their skills, and their motivations—it is nearly impossible to scaffold their access to disciplinary learning opportunities. Readiness then should also attend to ways that colleges know and serve their students well. What should students be *ready for* in

anticipation of deep disciplinary learning in college, and what should college be *ready for* in seeking to serve students well?

Implications and Future Directions for Research

This study contributes one investigation into the nature of disciplinary literacy learning in high school and in the transition to college. Much more research is needed regarding disciplinary literacy learning and teaching in K-12 and higher education. I will first consider the implications for K-12 learning and teaching and then will turn to implications and future directions for higher education research.

Disciplinary Literacy Learning in K-12

Researchers are continuing to investigate ways to best support learners across K-12 grades and contexts to engage in disciplinary inquiry and develop disciplinary literacy skills. Research into the “best practices” and lessons learned about inquiry engagement across contexts can support teachers to enact disciplinary literacy inquiry into their classroom contexts and this study offered one such example. There is a risk that as disciplinary literacy teaching is embedded in various contexts and schools, the disciplinary practices intended to be linked to inquiry might be reified to a point where the practices are artificial enactments and not useful tools for inquiry. Further research into inquiry and disciplinary literacy practices can help mitigate this risk and support the construction of more tools to assist teachers in these endeavors and approaches to teaching and learning in the disciplines. Additionally, this study holds implications for the importance of following students across disciplinary spaces, across classrooms, and over time as a way of capturing the literacy experiences, messages, instruction, tasks, and texts with which they engage

(e.g., Alvermann & Moje, 2013; Moje, 2013); others have argued for the importance of considering not just the (at times artificially) delineated spaces of grade levels or disciplines, but also how learners move among the various educational spaces of their lives (Stevens, Wineburg, Herrenkohl, & Bell, 2005). Studies of this kind could further reveal and highlight the navigation and disciplinary learning that students gain and move across spaces.

K-12 teachers' disciplinary identities. Teachers in the high school context of this study viewed themselves as members of the discipline they taught. In this way, they thought of themselves as apprenticing students into the domains (e.g., Lave & Wenger, 1991). This finding begs for research into how to best support teachers to develop these dispositions and perspectives within their domains. In teacher education, it may involve foregrounding the practices of domains and making overt and explicit the ways teachers naturally use these practices in their own disciplinary work. It would also require approaches to teacher education that organizes itself by domains and disciplines as a way to support teachers' development of these identities and practices, instead promoting the generic "content area literacy" approaches outlined in the literature review of this dissertation (e.g., Bain & Moje, 2012). Likely, teachers are being trained in the same higher education environments with similar structures and approaches to learning as the students in this study were in college; this means that teachers in college may also be kept at a distance from the very domains they are specializing in and into which they will apprentice future students. Higher education and teacher education, then, have the responsibilities to positioning future teachers to develop and possess skills as disciplinarian within domains, all while also supporting them to develop the teaching and learning approaches that can

best support future students—no small task for professional program that typically last a year and are receiving cuts and are largely under-resourced across universities and colleges. These realities provide yet another reason for colleges to position students within domains and allow for engagement in meaningful disciplinary literacy learning.

For developing in-service teachers' disciplinary dispositions, positioning teachers as disciplinary insiders could take various approaches. Teachers could engage in professional development that foregrounds the practices, disciplinary literacy approaches, and inquiry tasks and texts that would support student learning. Because standards-based reforms are requesting aspects of disciplinary literacy in the teaching across domains, it provides additional purposes for engaging in this kind of professional development (CCSSO, 2010; NGSS Lead States, 2013; NCSS, 2013). Teachers within schools could also form grade level teams and department teams that could consider how to align curricula to develop learning trajectories for the skills, practices, and disciplinary experiences both within and across grade levels. This would support teachers in providing intentional activities for supporting students to examine language and literacies within domains and evaluate across the domains to understand the “why” and “how” of domain-specific literacy practices, and less enacted form, but critically important aspect of disciplinary literacy skill development.

Higher Education Teaching and Learning and College Readiness

Given these eleven students high level of readiness, they also offer a “good case” of capturing what students should be *ready for* when they arrive in college. The students in this study received the kind of education that we are aiming and reforming for all K-12 students to engage in during secondary school. So, what are the implications for higher education teaching and learning given these students' experiences? Despite the fact that

these students were ready for more, their college professors must have assumed the students to be “unready” because students were kept at a distance from engaging in domain-specific learning. Instead, the college professors represented here organized courses around *telling* and *testing* – pedagogies that are widely known to not support students’ long-term knowledge and understandings (e.g., NRC, 2000, 2005). But, why would professors *tell and test* as the dominant activities of college if professors thought students were ready for more? It seems that these professors—especially those in the natural sciences and social sciences—were attempting to fill students’ heads with knowledge that they believed would make students ready, instead of supporting and scaffolding students to engage within disciplinary domains. Although I cannot generalize to all postsecondary teaching on the basis of this study, if it is the case that most professors in college are approaching instruction this way, then the result is that only rarely will students engage in disciplinary domains. This concern suggests an important avenue for future research that expands both the number and nature of university courses studied to more fully document what is happening across a range of institutions and disciplines. Where are postsecondary institutions doing the work of teaching well? What can we learn from those settings?

Some may argue that because some students come in with fewer literacy and study skills than these eleven students, college must use the lecture-based approach to provide “foundational” knowledge of a domain before moving to the use of relevant practices within the domain. Another response may be that students *will* in fact have these disciplinary literacy and inquiry experiences, but they will come later in their college careers, only after this foundational knowledge had been provided. These arguments,

however, are not well-grounded in what we know about how people learn (NRC, 2000, 2005). According to dominant learning theories, people learn best when the concepts they are learning are situated in a clear frame or purpose. They also learn best when their understanding and skill is scaffolded. Thus, foundational knowledge within a domain and inquiry work can and should go hand-in-hand. Students are attending college to build intellectual insights and likely as a way to gain skills and flexible literacies to be used in careers. But, as was described regarding disciplinary literacy theory, students are also in college to develop the skills to engage in knowledge construction and production. This engagement and access and development of disciplinary literacy skills and practices is a social right's issue (Lee, 2004; Moje, 2007): disciplinary literacy learning allows for access to and engagement in the structures of how knowledge is produced, disseminated, communicated, and conveyed and without this access, students may be positioned as outsiders and will continue to receive information passively without skills to question this knowledge. Passively receiving information is quite the opposite of what we need to be instilling in college students; the result would be a citizenry willing to accept information without questioning, without considering the origin of ideas and knowledge, nor would they have the tools to critique and consider responses to knowledge within and across domains. As others have argued, teaching and learning requires some reforms to move from transmission models of teaching to more beneficial and critical thinking approaches of instruction, but it appears that the emphasis on this transformation stops with secondary schooling. The field needs research on how to enact these disciplinary literacy and inquiry-based experiences productively in college learning and how courses could be structured to best support all learners. Further, more research is needed about how to

advance students' learning across courses using scaffolding and supports that fade over time as skills progress. The goals of learning outcomes and trajectories for learning in college would serve as a beneficial and shared approach to learning within domains.

Additionally, some may believe that disciplinary literacy learning will happen in college, but it will just happen later in students' college careers. Waiting for three or more years into a college career to support disciplinary engagement is, in essence, too late considering the cost and time invested by students. One-quarter of four-year college students and half of community college students leave or drop out of school within their first two years (Kazis, 2006). Learning must be relevant throughout college, but maybe most importantly relevant in the first two years.

The response that disciplinary literacy learning will happen later in college also makes the flawed assumption that students should only engage in disciplinary literacy learning and inquiry within their own domain of specialization. I would urge quite the opposite. Students should engage in inquiry, use sophisticated texts, and engage in meaningful tasks across domains (e.g., Moje, 2015; NRC, 2000). Without such experiences, students would lack flexible literacy skills to move and navigate among the various discourse communities and domains of their lives, let alone within and across those domains with exceptionally tacit, specialized, and often veiled practices (Gee, 1990). I would urge colleges, universities, and professors to consider how foundational knowledge, inquiry, and disciplinary literacy practices can be integrated into courses instead of considering them as mutually exclusive constructs. Courses can use inquiry activities and problem frames as the driver of knowledge-building throughout college. Secondary education literature, as well as the examples from the high school in this study, offer

numerous and rich examples of this integration across domains (e.g., Bain, 2005; Draper & Siebert, 2004; Norris & Phillips, 2003; Rainey, 2017; Roberts, 2007; Roth & Lee, 2004).

In this study, students were more than ready for college. They were able to successfully navigate and construct their own disciplinary experiences despite the majority of their faculties' less than supportive approaches to learning. Students reported the kind of learning and assessment activities and largely found them focused on test-taking, rote, memorization-based, and less than engaging. When students did encounter the rare opportunities for writing, project-based work, or other activities outside of tests, students often encountered confusion, which I argue resulted from a lack of robust instruction about problem frame, purpose, approaches to reading, writing, and thinking in the domain. Even with their readiness and skills of navigation, students were still confused, still dismayed, and still struggled, even to the point that three students from this study left their colleges entirely. And other students, even less ready, would struggle in more profound ways and in ways that other students may not be able to navigate. Observing this struggle – the result of lack of scaffolding and engaged learning – plays into the faculties' assumption about the lack of readiness and the *telling* and *testing* cycle continues. How does this cycle end and how can higher education move toward more robust, disciplinary teaching and learning and away from practices of *telling* and *testing*?

The findings of this study indicate a need for reform in higher education, particularly if K-12 settings reform in the ways that new standards documents intend. The realities of our time require different opportunities, learning structures, and more meaningful engagement in domains than outdated and less than beneficial forms of teaching and assessment support. These debates are not new ones. In 1929, Charles Good

published a report on *Teaching in Higher Education* and concluded that the reliance on lecture and poor teaching was one of the aspects of higher education that had to be reformed to allow access and development. In 1964, Hale, referenced Good and his call for reforms in his report on *University Teaching Methods* described the continued need for improving teaching and learning in college stating, “Overindulgence in lecture should be classed as a drug addiction on part of both giver and receiver” and that lecturing promoted the use of “talented manpower as ‘talking books’ ...and tends to keep the students a permanent adolescent” (p. 155). Researchers have continued to consider ways for higher education to reform the longstanding and outdated (even outdated in 1929) approaches to teaching and learning. Several advancements have been made in the realm of higher education including opportunities for interdisciplinary learning experiences (Lattuca & Spark, 2009) and bolstering of first year support and transition programs (Conley, 2005). However, as the quotations from Good and Hale illustrate these debates are longstanding and as the students’ experiences in this study illustrate, universities and colleges continue to fail to meet demands for reform. Using disciplinary literacy in this framework would foreground the importance of disciplinary literacy practices instead of the default rote, memorized, transmission model of education that can manifest when a framework is lacking. There remains a need for further research about the teaching and learning structures that supports students’ transitions from high school to college and how improved instruction can make an institution “ready” to serve all learners.

Navigation

This study highlighted the importance of navigation and agency as a part of how students successfully interact and learn within school contexts, K-12 and college included.

Future directions of research can focus on developing the “multiliteracies” and navigation skills that students need for college learning and beyond (New London Group, 1996; Moje, 2013). The eleven students in this study possessed skills of navigation (and likely further developed them within their college contexts), but it was unclear *how* and *in what ways* other students could be supported to develop these skills and make these navigation practices visible. The students in this study are also privileged in a variety of ways (e.g., Davey, 2012). These navigation skills and sense of agency were likely developed as a result of the typical routines of their high school. More research into navigation in school contexts and following students across time and space may reveal better ways of understanding how systems of learning can better support the goals we have for students’ sense of agency and inclusion in academic domain learning (e.g., Moje, 2013). Further, developing agentic students requires that students have opportunities for inquiry and disciplinary engagement across spaces and domains; only with experiences of engagement will students develop identities that include notions of disciplinary inclusion and confidence in disciplinary literacy skills and flexible literacies.

The construct of navigation is larger than what the students in this study displayed, although their navigation represented a specific kind of navigation and skill. Students in this study displayed a particular kind of navigation that leveraged their social and cultural capital as well as their educational backgrounds to engage in a new educational environment with new expectations. Historically marginalized students or students with home discourse communities less aligned with academic discourse communities may possess other rich navigation skills that the students in this study did not possess – attributes like sense-making of new language and genres, willingness for confusion and

perseverance, and other creative entries into academic endeavors. The students in this study were not used to being confused, especially as it related to academics. Future directions of research can investigate how navigation and disciplinary literacy learning can be actively promoted and how we can understand the various navigation skills students with different backgrounds, experiences, and goals possess. What is the balance of supportive navigation and scaffolding with opportunities for students to seek answers and clarification on their own? How can the construct of navigation be further refined to include the agency used to successfully advance within and across different spaces and discourse communities? Further research into how students with varying academic backgrounds, navigation skills, and scaffolding can provide cases of student learning and support.

Students' Learning from K-12 to College

The most important consideration and implication from this research relates to the students themselves. As I have argued, these students were privileged, “ready,” and possessed numerous resources on their path to college. Their educational realities when entering college requires further investigation and research. The fact is, these students were still largely successful in their academic outcomes based on the expectations of their professors and teachers. But, what if college did not support students’ own learning goals even with “successful” completion of the curriculum in college? What about other students who have fewer resources and less background in academic literacies and disciplinary literacy, specifically? How can college seek to serve all students well? This study calls for additional research following students across time and space—one critical space being the transition from high school into college—to understand the particular realities students

face across contexts. What are the ways that secondary schools and colleges can better support students for this navigation and transition?

And what of college: what are the solutions to improving teaching and learning (answering the calls of many reform efforts)? Different branches and theorists are attempting to provide solutions to the issues of college learning (big data and “personalized” learning through college; online college courses or hybrid courses). My argument is not against the inclusion of any tool or technology that truly benefits teachers and learners. However, teaching quality is at the core of any reform effort in education—other tools are merely bandages on an unhealed wound. It takes a transformation of the core of teaching and learning to enact reform. The eleven students’ stories highlight the need for more attention to the learners within college campuses and their sometimes “invisible experiences” across their courses. The young people repeatedly told me about their frustration, difficulty, boredom, attempts at “jumping through hoops,” but most important, their desire for more. As reform efforts in K-12 education seek to better prepare students for their future learning and careers, how can we make sure students get even more out of college than the stories these students tell?

Conclusion

I opened this dissertation by indicating that a key goal of the U.S. Department of Education was supporting all students for college and career readiness. Standards and other educational benchmarks indicate the importance of this goal and the ways K-12 education is being reformed. Goals for college readiness and reforms require a re-imagining of teaching and learning in K-12 settings. Teachers are being held to higher and

higher standards of student outcomes that require disciplinary literacy practices and skill development throughout elementary and secondary school. The students in this study experienced an exceptional disciplinary literacy-focused high school environment. They experienced an educational model to which we want all students to have access. However, “college readiness” may not be a useful construct considering the realities of learning in college. The students in this study were “college-ready” and, yet, still faced severe instances of confusion, difficulty, feelings of purposelessness in academic work, and feelings of exclusion within domains of college. Although students did experience inquiry-driven courses and some examples of disciplinary literacy learning in courses (especially in certain domains), more often than I thought would be the case (in fact in a large majority of their courses), students in this study reported that learning mostly constituted telling and testing in college, which does not reflect all of what we know of learning theories and quality teaching (NRC, 2000, 2005). Because the students possessed social and cultural capital and a sense of agency in academic spaces, they were able to navigate and construct their experiences in college, especially as it related to engaging more deeply and making sense of practices in domains (and as supplements to this lacking in their courses and instruction).

The experiences of the eleven students (and their 3500 or so peers) across multiple contexts showed the dominance of *telling* and *testing*, especially in the natural sciences and social sciences. If an important societal goal is for all students to have access and opportunities for college and careers, is college, in fact, *ready for* the diversity of students who desire higher education learning experiences on their campuses? How would students with fewer resources, inequitable learning opportunities in K-12 schooling, and less of a

sense of agency in academic spaces navigate and construct their experiences? In what ways should colleges be responsible for supporting all students to gain meaningful and flexible literacies in college? How can college support disciplinary learning opportunities *within* domains and not just *about* domains? How can college support students' developing understandings of domains, their developing sense of agency, and their skills of navigation across the literacy demands of their lives? How are the academic experiences and realities counter to the goals we have for people seeking better opportunities in college and careers?

There is a shared responsibility between K-12 and higher education to develop and support disciplinary literacy learning, what Lee (2004) has called the "civil right of the twenty-first century." College readiness also becomes a reciprocal relationship between K-12 education developing and supporting students' practices and skills to be "ready for" the continued learning in college; and college has the responsibility to be "ready for" the students they seek to serve. Outdated approaches to education and educating are no longer acceptable in our dynamic and complex society. Stories of agentic, college-ready students' realities in college call for continued reform and re-imagining across all levels of education to create equitable, meaningful, and complex learning opportunities for all learners.

Appendix A: Junior Year Questionnaire and Interview Protocol Excerpts

“Getting to know you”

1. Tell me about yourself.
 - a. How would your friends describe you?
 - b. How would your parents describe you?
 - c. What is your favorite subject in school? Why?
 - d. What are some things you do for your favorite subject in school? How do you learn about it?

Writing and reading preferences

2. What kinds of things do you write for school?
3. What kinds of things do you read for school?
4. What kinds of things do you read and write out of school?
5. What kinds of things are the easiest/most difficult for you to write?
6. What kinds of things are the easiest/most difficult for you to read?
7. Would you say that you enjoy writing?

Disciplinary practices

8. What are some things you are asked to write across your classes in high school?
9. What are some things you are asked to read across your classes in high school?
10. What do you feel most confident to read; to write?
11. What is the most difficult or challenging thing for you to write? How do you handle this challenge?
12. What are some things you do while you are writing or reading?
13. When you are asked to write an essay for history/science/other subject, how do you decide what you are going to write?
 - a. How do you revise?
 - b. How do you incorporate the text you are writing about?
 - c. Why do you think your teacher assigns you writing/reading in these subjects?
14. What do you notice as the major similarities or differences among the things you are asked to do for school?

Appendix B: Literacy Demands and Navigation During College Interview Protocol

Semi-structured protocol for interviews during freshman year, and after each semester:

1. Tell me about your courses this semester. What did you take and what made you choose these courses?
 - a. Are you classes mostly freshman seminar courses, or upperclass students?
 - b. What are the structures and size of your courses? Seminar, survey, labs, discussion, a combination?
2. What was the most interesting assignment you had?
 - a. Why was it interesting? What did it teach you about the subject matter?
3. What was the most challenging?
 - a. If you have not written this kind of assignment before, how did you approach it? How did you know what to do? What did you rely on?
 - b. What were the texts and task associated with this assignment?
 - c. Looking across the texts and tasks that you were asked to do this semester and in previous work, are there any patterns that you notice across the texts and tasks? What are some similarities or differences that you notice?
4. What was the most challenging thing you read? How did you approach this challenge?
 - a. How did you know how to engage with the assignment?
 - b. Who helped you, if anyone? How did your course/professor/instructor or other resource help you with this challenge?
5. Tell me about a time that you reached out for help with an assignment. Who did you ask? What was the response? Was it helpful?
6. Tell me about your biggest success from this semester? What was your biggest challenge? (asked about reflecting on the full year during spring interview)
7. Was there a time when you met with a professor one-on-one?
 - a. What did you meet with the professor about?
 - b. Did you ever follow up about a grade? Did you ask questions about feedback or an exam?
 - c. How did you know to do this? Have you done this before?
8. What do you think best prepared you from high school for your work in college? What strategies or approaches do you find yourself using to do work in college?
9. Now that you know more about college, what kinds of things might have given you more preparation for this environment?

- a. What kinds of academic preparation could you have benefited from?
 - b. What kinds of financial, social preparation could you have benefited from?
 - c. What kinds of family practices helped you prepare for school?
10. If you were asked to advise someone about being “college ready” and what this mean, what would you tell them based on your experience?
11. In what ways do you think you are more or less prepared among your peers?

Anticipation for the Future

12. What is your plan for next semester? What do you anticipate about the demands of these courses?
13. What are you becoming most interested in (i.e. classes, major, pre-professional tracks plans?)
14. What are your goals for the future?

Additional questions for use during sophomore year interviews:

Retrospective Interview questions:

1. Last year, you mentioned [insert quotation about difficulty in a course and with a disciplinary literacy, language-based task]. How might you engage in this work now, after an additional year in college?
 - a. What other learning experiences have you had that give you more skills to engage in this work?
 - b. What have you learned that you can apply now that you couldn't then?
2. What advice would you give to another student who may take this course and completing [major assignment] in the future?
 - a. What resources, strategies, and skills would you encourage the student to use?
 - b. What skills do you think that student would need to be successful in his course?

Specialized domain-knowledge of students:

3. Now that you understand a bit more about domain/field that you are majoring in, how would you describe the work that happens in this field?
 - a. How would you describe the literacy practices that happen in this field? How do experts read, write, talk, and think?
 - b. In what ways do you think you have learned to participate in the discipline/domain/field?

Appendix C: “Daily Diary” Prompts

1. I am currently working on (assignment/task) for (course name). [survey question to be fill in the blank]
2. What I am doing to complete the work is: [open-ended response]
3. The language and literacy skills I am currently using include: [open-ended response]
4. I have completed work like this in the past: [yes/no]
 - a. If yes, I completed work like this in the past in (course name, internship, work) [fill in the blank].
5. My confidence in completing this work is: [scaled response]
Very high High neutral moderate low
6. The tools (readings, guides, study groups, online tools) I am using to complete this work include: [open-ended response]
7. The difficulties I anticipate about this work include: [open-ended response]
8. I have received clear instruction about how to complete this work: [yes/no]
 - a. If yes, the instruction I received includes: [multiple choice, check all that apply]
 - i. Discussion about how to approach the work during class
 - ii. Discussion about how to approach the work from professor during office hours
 - iii. Discussion about this work from teaching assistant/graduate student instructor
 - iv. Models of this work provided in class
 - v. I have been given feedback on similar work during this course or other courses
 - vi. Other:
9. The work I completed earlier today includes:
 - a. The literacy skills (reading, writing, thinking, discussing, researching, reflecting) I used to complete this work includes:
 - b. Explain:
10. My schedule for the remainder of the day includes:

Appendix D: Survey for academic record and background

Academic Background Questions – High School

1. What were the MATH classes that you took in high school? List them in order from 9th-12th grade courses.
2. In MATH courses, what were your grades in these courses in high school? Explain, as needed.
3. What were the HISTORY/SOCIAL STUDIES classes that you took in high school? List them in order from 9th-12th grade courses.
4. In HISTORY/SOCIAL STUDIES courses, what were your grades in these courses in high school? Explain, as needed.
5. What were the SCIENCE classes that you took in high school? List them in order from 9th-12th grade courses.
6. In SCIENCE courses, what were your grades in these courses in high school? Explain, as needed.
7. What were the ADVANCED PLACEMENT courses you took in high school? List them in order from 9th-12th grade courses.
8. What were the arts, theatre, and other ELECTIVES that you took in high school?
9. In your AP COURSES and ELECTIVES, what were your grades in these courses in high school? Explain, as needed.
10. Grade point average at high school graduation.
11. Outcomes of standardized tests (ACT, SAT, SATII subject area tests).

Academic Experiences Questions – College

12. Current GPA college
13. What courses have you earned the highest grades in through college? Explain, as needed.
14. In what courses have you scored/been graded the lowest in through college? Explain, as needed, for context.
15. In general, what patterns of grades have you noticed in your coursework in college? (e.g., in Latin I tend to get A- or B+, whereas in biology I always got Bs or Cs). Explain your observations here.
16. In what ways have grades or other feedback influenced you path in college (or your current field)?
17. As of today, what is your declared major, your focus area, and/or path and plan in college and career? Describe plans and major areas/focus as you are able.

Appendix E: College Entrance Exam Details

	ACT/ SAT scores	Percentile of ACT/SAT score	GPA in high school upon graduation
Andrew	36	99	4.0
Jessica	33	99	3.94
Shyloh	2100	97	4.0
Cassie	31	96	3.9
Wyatt	31	96	3.6
Jane	30	95	3.7
Ryan	30	95	3.8
Jennifer	1900	90	3.9
Michelle	26	83	2.9
Erin	25	80	2.7
Hope	22	56	2.7

Appendix F: Advanced Placement Score by students

AP COURSES		SCORES ON EXAMS
ANDREW	US History	5
	English Language	5
	Latin	5
	Statistics	5
	Chemistry	5
	Physics C	5
	Computer Science	5
	Biology	5
	Calculus BC	5
JENNIFER	Chemistry	3
	Latin	4
	Macroeconomics	4
	Calculus AB	3
CASSIE	Psychology	5
	US History	3
	English Language	3
	French	5
	Calculus AB	3
WYATT	Latin	3
	Biology	4
	Physics C	4
	US History	4
	Calculus BC	4
HOPE	US History	3
	Microeconomics	3
	Macroeconomics	4
SHYLOH	English Language	5
	Spanish	5
	Biology	5
	Calculus BC	3
MICHELLE	Psychology	4
JANE	English Language	4
	Spanish	5
	Calculus	3
JESSICA	Physics	5
	Calculus BC	5
	English Language	5
	US History	5
	Statistics	4
	Chemistry	3
	Biology	3
	Chinese	5

RYAN	Statistics	3
	English Language	4
	Calculus AB	4
ERIN	US History	Scores not reported*
	Calculus AB	Scores not reported*
TOTALS	47 courses	$\mu = 4.14$

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